Ontario

Ontario Geological Survey
Open File Report 6126

Sudbury Area Lake Sediment Geochemical Survey

2004

104-03805/

Ontario

ONTARIO GEOLOGICAL SURVEY

Open File Report 6126

Sudbury Area Lake Sediment Geochemical Survey

by

R.D. Dyer, P.A. Takats and V.E. Felix

2004

Parts of this publication may be quoted if credit is given. It is recommended that reference to this publication be made in the following form:

Dyer, R.D., Takats, P.A. and Felix, V.E. 2004. Sudbury area lake sediment geochemical survey; Ontario Geological Survey, Open File Report 6126, 106p.

© Queen's Printer for Ontario, 2004

© Queen's Printer for Ontario, 2004.

Open File Reports of the Ontario Geological Survey are available for viewing at the Mines Library in Sudbury, at the Mines and Minerals Information Centre in Toronto, and at the regional Mines and Minerals office whose district includes the area covered by the report (see below).

Copies can be purchased at Publication Sales and the office whose district includes the area covered by the report. Although a particular report may not be in stock at locations other than the Publication Sales office in Sudbury, they can generally be obtained within 3 working days. All telephone, fax, mail and e-mail orders should be directed to the Publication Sales office in Sudbury. Use of VISA or MasterCard ensures the fastest possible service. Cheques or money orders should be made payable to the *Minister of Finance.*

Mines and Minerals Information Centre (MMIC) Tel: (416) 314-3800
Macdonald Block, Room M2-17
900 Bay St.
Toronto, Ontario M7A 1C3

Mines Library Tel: (705) 670-5615
933 Ramsey Lake Road, Level A3
Sudbury, Ontario P3E 6B5

Publication Sales Tel: (705) 670-5691(local)
933 Ramsey Lake Rd., Level A3 1-888-415-9845(toll-free)
Sudbury, Ontario P3E 6B5 Fax: (705) 670-5770
E-mail: pubsales@ndm.gov.on.ca

Regional Mines and Minerals Offices:

Kenora - Suite 104, 810 Robertson St., Kenora P9N 4J2

Kirkland Lake - 10 Government Rd. E., Kirkland Lake P2N 1A8

Red Lake - Box 324, Ontario Government Building, Red Lake P0V 2M0

Sault Ste. Marie - 70 Foster Dr., Ste. 200, Sault Ste. Marie P6A 6V8

Southern Ontario - P.O. Bag Service 43, 126 Old Troy Rd., Tweed K0K 3J0

Sudbury - Level B3, 933 Ramsey Lake Rd., Sudbury P3E 6B5

Thunder Bay - Suite B002, 435 James St. S., Thunder Bay P7E 6S7

Timmins - Ontario Government Complex, P.O. Bag 3060, Hwy. 101 East, South Porcupine P0N 1H0

Toronto - MMIC, Macdonald Block, Room M2-17, 900 Bay St., Toronto M7A 1C3

This report has not received a technical edit. Discrepancies may occur for which the Ontario Ministry of Northern Development and Mines does not assume any liability. Source references are included in the report and users are urged to verify critical information. Recommendations and statements of opinions expressed are those of the author or authors and are not to be construed as statements of government policy.

If you wish to reproduce any of the text, tables or illustrations in this report, please write for permission to the Team Leader, Publication Services, Ministry of Northern Development and Mines, 933 Ramsey Lake Road, Level B4, Sudbury, Ontario P3E 6B5.

Cette publication est disponible en anglais seulement.

Parts of this report may be quoted if credit is given. It is recommended that reference be made in the following form:

Dyer, R.D., Takats, P.A. and Felix, V.E. 2004. Sudbury area lake sediment geochemical survey; Ontario Geological Survey, Open File Report 6126, 106p.

Contents

Abstract xi

Introduction 1

Geology 2
  Bedrock Geology 2
  Quaternary Geology and Topography 5

Overview of Historical and Current Mining Activities 5

Sudbury's Environmental Legacy 7

Sediment Sampling Methods 8

Water Sampling and Limnological Parameters 9

Sample Preparation and Analytical Methods 9

Quality Control Results 11

Discussion of Limnological Parameters: Water pH and Conductivity 12

Comparison of OGS Lake Sediment Geochemistry with Other Studies 14
  Background 14
  Comparisons 15

General Considerations for Lake Sediment Geochemical Data Interpretation 19

Discussion of Regional Lake Sediment Geochemical Patterns 20

Description of Selected Anomalous Areas 22

Summary and Conclusions 35

Acknowledgments 35

References 35

Appendix A Proportional Dot Maps of Lake Water pH, Electrical Conductivity, Lake Depth and Sediment Loss-on-Ignition (LOI) 39

Appendix B Proportional Dot Maps of Ag, Al, As, Ba, Be, Br, Ca, Cd, Ce, Co, Cr, Cs, Cu, Fe, Hg, K, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Pd, Pt, PGEs (Pd+Pt+Rh+Ir), Rb, Total REEs (Nd to Lu), S, Sb, Sc, Sn, Sr, Th, Ti, U, V, W, Zn and Zr in Lake Sediment 44

Appendix C Lake Sediment Analytical Data for Lake Depth, Loss-on-Ignition, pH, Conductivity, Temperature, Ag, As, Cd, Co, Cr, Cu, Fe, Na, Ni, Pb, Pd, Pt, S, U and Zn 87

Metric Conversion Table 106

FIGURES

1.. Location map of Sudbury survey area........ 1

2. Generalized bedrock geology........ 3

3. Generalized Quaternary geology........ 6

4. Comparison of Ni in lake sediments from the National Geochemical Reconnaissance (NGR) program and Ontario Geological Survey (OGS) data sets........ 17

5. Plot of NGR survey (Pb+Cu+Ni) : OGS survey (Pb+Cu+Ni) analyses in lake sediments........ 18

6. Location of geochemically anomalous areas. 24

7. Land tenure showing geochemically anomalous areas described in text. 25

8. Sample site location map for the Sudbury area lake sediment geochemical sampling survey........ back pocket

PHOTO

1. OGS sediment sampling coring device. 8

TABLES

1. Sudbury area lake sediment data set, summary of elements analyzed by ICP, FA–ICP–MS and INAA and quality control data, including estimates of precision........ 10

2. Comparison of deep (pre-industrial) lake sediment (Hunt 2003) and OGS survey (OGS, this study) samples, Sudbury region. 16

Miscellaneous Release—Data 131

Lake Sediment and Water Quality Data from the Sudbury Area, Northeastern Ontario; by R.D. Dyer

Lake sediment geochemical and lake water quality (limnological) data, including quality control data, collected from a survey of 1487 sites in the Sudbury area are released in conjunction with Open File Report 6126. Data are available as Microsoft® Excel 97 (*.xls*) files on one CD-ROM.

This CD-ROM is available separately from the report.

Abstract

Field work for a lake sediment geochemical survey of the Sudbury Region was carried out between June and August, 2001. Water quality parameters (pH, electrical conductivity) and deep lake sediment samples were collected at more than 1300 lake sites. The Sudbury survey area lies within an area affected by industrialization and urbanization as well as comparatively pristine forested land. Therefore, the natural background chemistry of the lakes and waterways has superimposed on it signatures of urbanization and industrialization. Lake sediment samples were collected using a gravity coring device that allowed for the rapid collection of lake sediments and the reliable discrimination between surface (potentially contaminated) and deep (pre-industrial) lake sediments. Preliminary interpretation of the lake sediment data shows the presence of over 40 geochemically anomalous areas or locations. Anomalous elements include Ag, As, Cr, Cu, Mo, Ni, Pt, Pd and Zn. This survey has generated several new target areas for potential platinum group element and base metal mineralization. As of January 2004, some of the anomalous areas or locations were available for staking. Digital geochemical data for this survey have been released separately from this report as Miscellaneous Release—Data (MRD) 131.

Sudbury Area Lake Sediment Geochemical Survey

R.D. Dyer[1], P.A. Takats[1] and V.E. Felix[1]

Ontario Geological Survey
Open File Report 6126
2004

---

[1]Sedimentary Geoscience Section, Ontario Geological Survey, Sudbury, Ontario

Introduction

The Sudbury area lake sediment survey was undertaken under the auspices of Operation Treasure Hunt (OTH), a three-year program of geological, geochemical and geophysical investigations of Ontario, covering areas of high mineral potential as well as areas traditionally considered to have unknown mineral potential. The types of geoscientific survey, locations and areal extent, followed the recommendations received from the technical subcommittee of the Ontario Geological Survey Advisory Board. The major components of the OTH program were surficial geochemical and/or indicator mineral surveys and airborne geophysical surveys.

The lake sediment sampling was carried out during the period June 25 to July 20, 2001 by Aquatic Sciences Inc., of St. Catharines, Ontario, under contract to the Ontario Geological Survey (OGS). This project was one of 3 OTH lake sediment surveys carried out in 2001, the others being the adjacent River Valley–Temagami area and the Lac des Iles area in northwestern Ontario. This report and data release concerns the Sudbury region and encompasses almost the entire area of the City of Greater Sudbury (Figure 1). The survey area is represented on National Topographic System (NTS), 1:50 000 scale map sheets 41 I/6, 41 I/7, 41 I/10, 41 I/11 and 41 I/15.

During this study, a total of 1489 lake sites were visited, from which over 1300 lake sediment samples were collected and submitted for analysis to several laboratories for determination of over 50 major, minor and trace elements, including Au, Pt and Pd. Limnological (water quality) parameters were also collected at 1463 lake sites. The data described in this report is available digitally in spreadsheet (*.xls*) format within Miscellaneous Release—Data 131 (MRD 131).

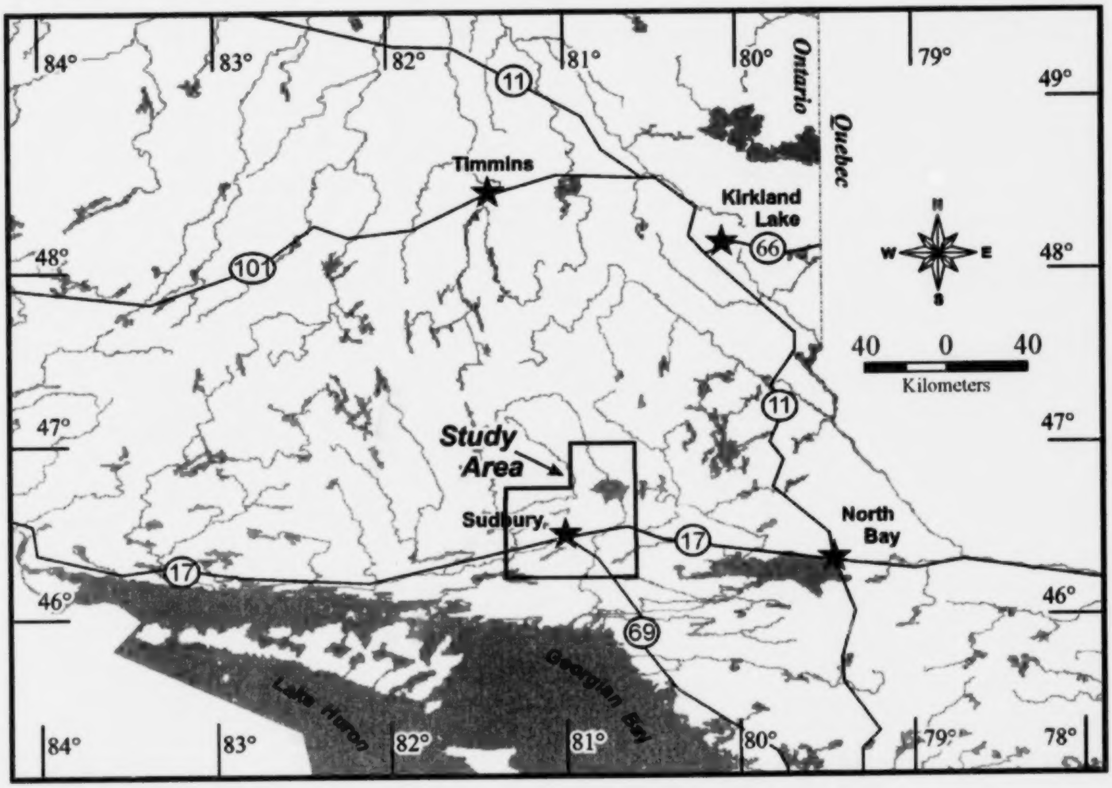


Figure 1. Location map of Sudbury survey area.

Initially, since the mandate of OTH was mineral exploration oriented, it was planned not to collect lake waters. However, due to the special environmental circumstances of the Sudbury region, it was decided to collect water samples, on behalf of a Laurentian University project, from each lake visited by this survey. Therefore, lake water collection was added to the project; well over 3000 water samples were collected in the area stretching from Sudbury through to the adjoining Temagami survey region.

Lake sediment geochemical sampling for mineral resource appraisal in the Sudbury area, albeit at a reconnaissance scale, was previously completed during the National Geochemical Reconnaissance (NGR) lake sediment program carried out jointly by the Geological Survey of Canada during the late 1970s and 1980s (Hornbrook and Friske 1988).

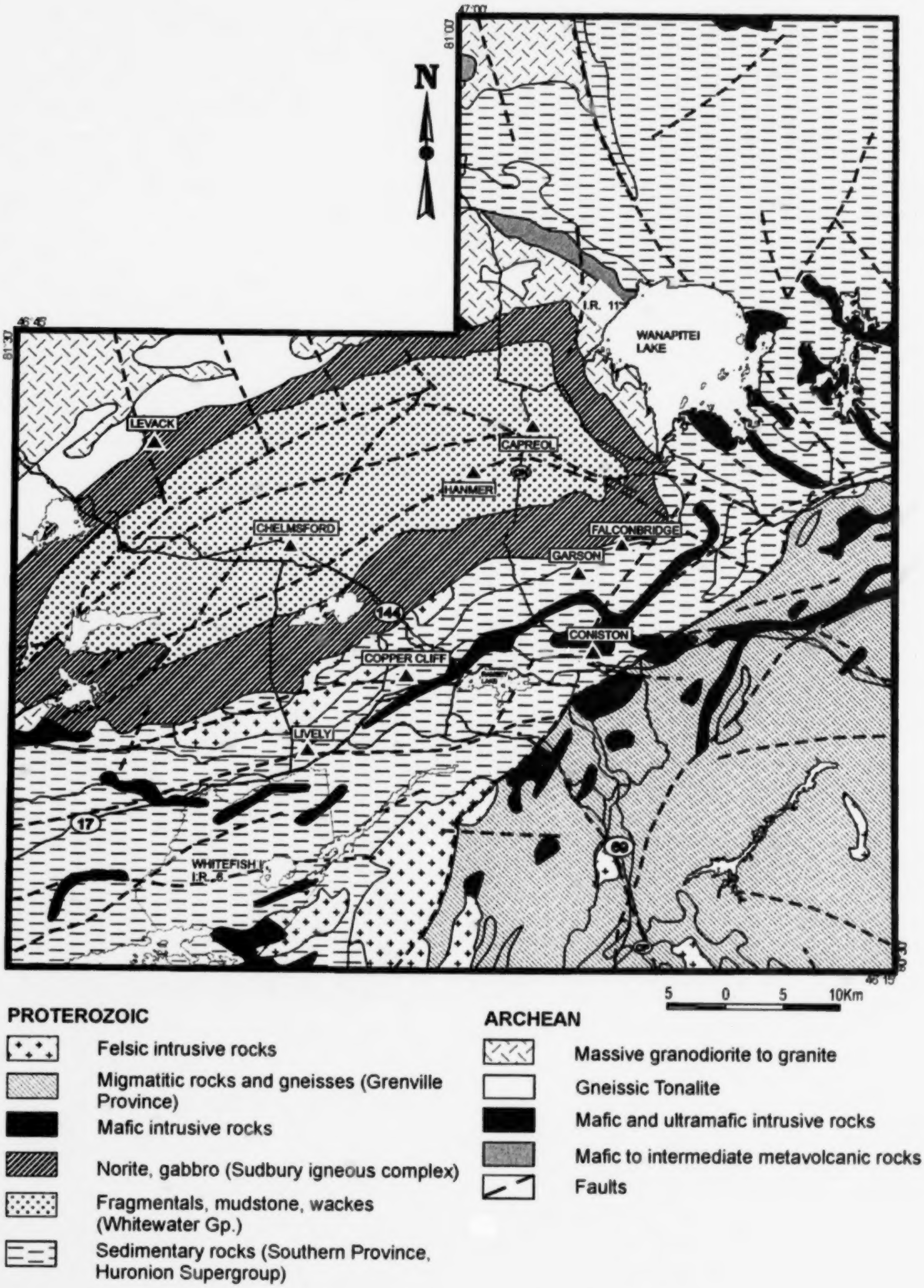
Geology

BEDROCK GEOLOGY

The Sudbury survey area lies near the intersection of 3 Precambrian structural provinces of the Canadian Shield. The oldest rocks in the Sudbury area belong to the Superior Province and form the footwall rocks along the north and east contacts of the Sudbury Igneous Complex (Figure 2). Archean rocks consist of gneisses, migmatites, metavolcanic and metasedimentary rocks, and mafic and felsic plutonic rocks (Dressler 1984). Archean mafic to felsic metavolcanic rocks and associated pyroclastic rocks occur in the northern portion of the survey area in Hutton and Parkin townships. The metavolcanic rocks contain small lenses of Algoma-type banded iron formation with anomalous base metal concentrations (Innes and Colvine 1984). Iron pellets were produced from the iron formation during the early-to mid-1900s at the Moose Mountain Mine (Rousell et al. 2002).

Paleoproterozoic metasedimentary and subordinate metavolcanic rocks of the Huronian Supergroup were deposited on the Archean craton between 2450 and 2219 Ma (Bennett et al. 1991). These rocks form the footwall along the southern contact of the Sudbury Igneous Complex (SIC). The Huronian Supergroup is subdivided into 4 stratigraphic groups, which, in general, consist of basal conglomerates overlain by mudstone, siltstone and coarse arenite (Bennett et al. 1991). The Elliot Lake Group is the oldest and the only group that contains mafic to felsic metavolcanic rocks with associated pyroclastic rocks. Felsic plutons located along the southern margin of the SIC intrude metavolcanic and metasedimentary rocks of the Elliot Lake Group. Several types of mineralization are associated with rocks of the Huronian Supergroup in the Sudbury area. The largest and best known mineralization type are the paleo-placer uranium deposits that accumulated in the quartz-pebble conglomerate units of the Matinenda Formation of the Elliot Lake Group (Innes and Colvine 1984). The metavolcanic units in the lower part of the Elliot Lake Group also may host volcanic-associated massive sulphide mineralization. These are primarily Cu-rich deposits, however, Au and Ag were recovered from the Pater Mine deposit (Fyon et al. 1991).

Mafic plutons and sills of the East Bull Lake intrusive suite were emplaced at the base of the Huronian Supergroup in the Sudbury area (James et al. 2002). The largest of these plutons, located west of Sudbury, are the East Bull Lake and the Agnew Lake intrusions, which have had age determinations of 2480 and 2491 Ma, respectively (Krogh et al. 1984). These intrusions are currently being explored for Cu-Ni-PGE mineralization. East of the survey area, the related River Valley gabbronorite intrusion (2475 Ma) contains anomalous PGE values generally associated with semi-massive Cu mineralization (James et al. 2002). Smaller gabbro-anorthosite intrusions of the suite are located in the survey area along the margin of the SIC. The Drury intrusion, located in Drury Township along the western boundary of the survey area, locally contains Ni-Cu-PGE mineralization (James et al. 2002; Rousell et al. 2002).



N
47°00'
81°07'
46°45'
81°30'
46°15'
80°30'
I.R. 11
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
144
17
69
WHITEFISH L. I.R. 6
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

Figure 2. Generalized bedrock geology (*from* OGS 1991).

Nipissing gabbro sills and dikes, emplaced between 2219 and 2210 Ma, intrude all 4 groups of the Huronian Supergroup, and were emplaced after early faulting and folding of the Huronian rocks (Dressler 1984). The Nipissing gabbro intrusions locally host magmatic Ni-Cu-PGE mineralization and polymetallic skarn mineralization is locally developed where the gabbro sills intruded calcareous sediments of the Espanola Formation (Fyon et al. 1991).

The Sudbury Event, which is thought to be the result of a meteorite impact or explosive volcanism (Dressler 1984), is considered to have been relatively instantaneous and approximately equivalent in age (1.85 Ga) to the Sudbury Igneous Complex (Krogh et al. 1984). The Sudbury Igneous Complex is an elliptical shaped structure that measures approximately 60 by 25 km and consists of 4 units. The lowermost unit of the complex is known as the Contact Sublayer. The Sublayer consists of an inclusion-bearing norite to quartz-diorite that occurs as discontinuous lenses to flat sheets along the contact with the Footwall and Footwall Breccia and also forms quartz-diorite offset dikes (Dressler 1984). Stratigraphically above the Contact Sublayer are norite, quartz gabbro and granophyre. The overlying Whitewater Group occurs only within the Sudbury Basin and consists of heterolithic breccias, mudstones, siltstones and wackes (Dressler et al. 1991). The Whitewater Group is composed of 4 conformable formations. The Onaping Formation forms the base of the Group and is intruded by the underlying granophyre (Muir and Peredery 1984). Stratigraphically overlying the Onaping Formation are the Vermilion, Onwatin and Chelmsford formations.

The Ni-Cu-PGE ore deposits related to the Sudbury Structure are found near the lower contact of the Sudbury Igneous Complex within the Sublayer, Footwall and Footwall Breccia and within quartz-diorite offset dikes that can extend many kilometres into the Footwall. The Contact Sublayer is the most important host for Ni-Cu-PGE mineralization within the Sudbury Igneous Complex (Naldrett et al. 1984). The mineralization occurs within the Contact Sublayer and in the underlying footwall rocks and Footwall Breccia at or near the base of the Sudbury Igneous Complex (Rousell et al. 2002). The rocks of the Whitewater Group also host a variety of mineralization types as summarized in Rousell et al. (2002).

Southeast of the Sudbury Structure, rocks of the Southern Province are in fault contact with high-grade metamorphic rocks of the Grenville Province, which is a complex orogenic belt approximately 1.1 billion years old (Easton 1992). The contact between the 2 provinces is known as the Grenville Front. Grenville Province rocks in the study area occur mainly within the Grenville Front Tectonic Zone, which is up to 30 km wide and consists of deformed and metamorphosed rocks of the Superior and Southern provinces (Easton 1992). The Wanapitei Complex is located approximately 14 km southeast of Sudbury and lies within the Grenville Front Tectonic Zone. The complex consists of a variety of phases, consisting of older gabbro and anorthositic rocks likely related to the East Bull Lake intrusive suite, and younger (~1747 Ma) granodiorite to quartz diorite. A mineralized zone consisting mainly of pyrrhotite with lesser amounts of chalcopyrite, pentlandite and pyrite occurs as disseminations and blebs that are distributed unevenly throughout the complex, predominantly in the older gabbroic and anorthositic rocks (Rousell et al. 2002).

The Huronian Supergroup and the Grenville Province in the study area are separated by plutonic and metavolcanic rocks of the Killarney Magmatic Belt (Easton 1992), which were emplaced at ~1750 Ma and ~1450 Ma. Most significant to this study is the Chief Lake batholith. This batholith consists of potassium feldspar megacrystic granodiorite to monzogranite that has a strong airborne gamma-ray spectrometric signature, and which was emplaced at 1464 Ma (Davidson and van Breemen 1994). The batholith includes rafts of older, intermediate composition granitoid rocks, which were likely emplaced at ~1750 Ma (Davidson and van Breemen 1994).

QUATERNARY GEOLOGY AND TOPOGRAPHY

Barnett and Bajc (2002) provide a detailed overview of the Quaternary geology of the Sudbury area. A significant portion of the land surface in the Sudbury survey area is strongly bedrock controlled yet most of the region is covered with at least a thin veneer of Quaternary deposits (Figure 3). The north rim of the Sudbury Intrusive Complex (SIC) consists of bedrock hills and ridges that rise to elevations greater than 440 m above sea level (asl) with local relief between 60 and 90 m. Quaternary deposits in this area are generally less than 1 m thick, except in structurally controlled valley bottoms where glaciofluvial outwash deposits are known to exceed 60 m in thickness (Barnett and Bajc 2002). Elevations at the east and southern rims of the SIC are between 335 to 385 m and 305 to 335 m asl, respectively, with local relief up to 40 m. The central portion of the Sudbury Basin is a low-relief plain that gently slopes to the southwest. Elevations range from 260 to 300 m asl with local relief generally less than 15 m. Thick sequences of glaciofluvial sand and gravel occur south of the north rim of the SIC and south of Wanapitei Lake. Thick sequences of glaciolacustrine sediment and organic deposits are located north of the southern rim of the SIC. Glaciolacustrine sediments also occupy bedrock controlled valleys in the southeastern portion of the survey area. Ice flow indicators define a general direction of ice flow, strongly controlled by regional topography, from the northeast to the southwest across the study area (Barnett and Bajc 2002).

Bajc and Hall (2000) reported on detailed Quaternary mapping and soil sampling along the entire north and east ranges of the SIC. Their findings included several important observations and recommendations that have a bearing on the use of surficial media geochemical techniques in the Sudbury area, namely:

1. Humus (decomposed organic material below forest leaf litter) appears to be strongly effected by airborne fallout of metals from the Sudbury area roasting and smelting operations. Copper and nickel humus geochemistry display no spatial association with known mineral deposits or occurrences. In general, humus is an unreliable exploration sample medium in the Sudbury region.
2. Three facies of till are present in the Sudbury region, all with very low matrix carbonate content. Therefore, the Sudbury area has very little in the way of natural buffering capacity and consequently, pH conditions are generally amenable for chemical (hydromorphic) transport of metals downslope toward waterways and low lying areas.
3. Copper and nickel geochemistry of "B" and "C" horizon soils developed in till show an excellent spatial relationship with known Cu-Ni mineralization.

Overview of Historical and Current Mining Activities

The Sudbury mining camp is an important component of worldwide mineral production. It is one of the world's largest mining areas, producing approximately $2 billion worth of metals annually. In 2001, Sudbury contributed 9% of the world's supply of nickel, and 4.1% of the world's supply of PGEs (P. Cashin, MNDM, personal communication, 2004).

Currently, there are 13 mines in various stages of operation around the Sudbury Basin employing 4700 workers (M. Cosec, MNDM, personal communication, 2004). The principal commodities extracted from sulphide ore are copper, nickel, cobalt, platinum group metals (PGM) and sulphur is recovered as sulphuric acid. The major companies that have dominated the local mining industry for the past 76 years are INCO (The International Nickel Company) and Falconbridge Ltd.

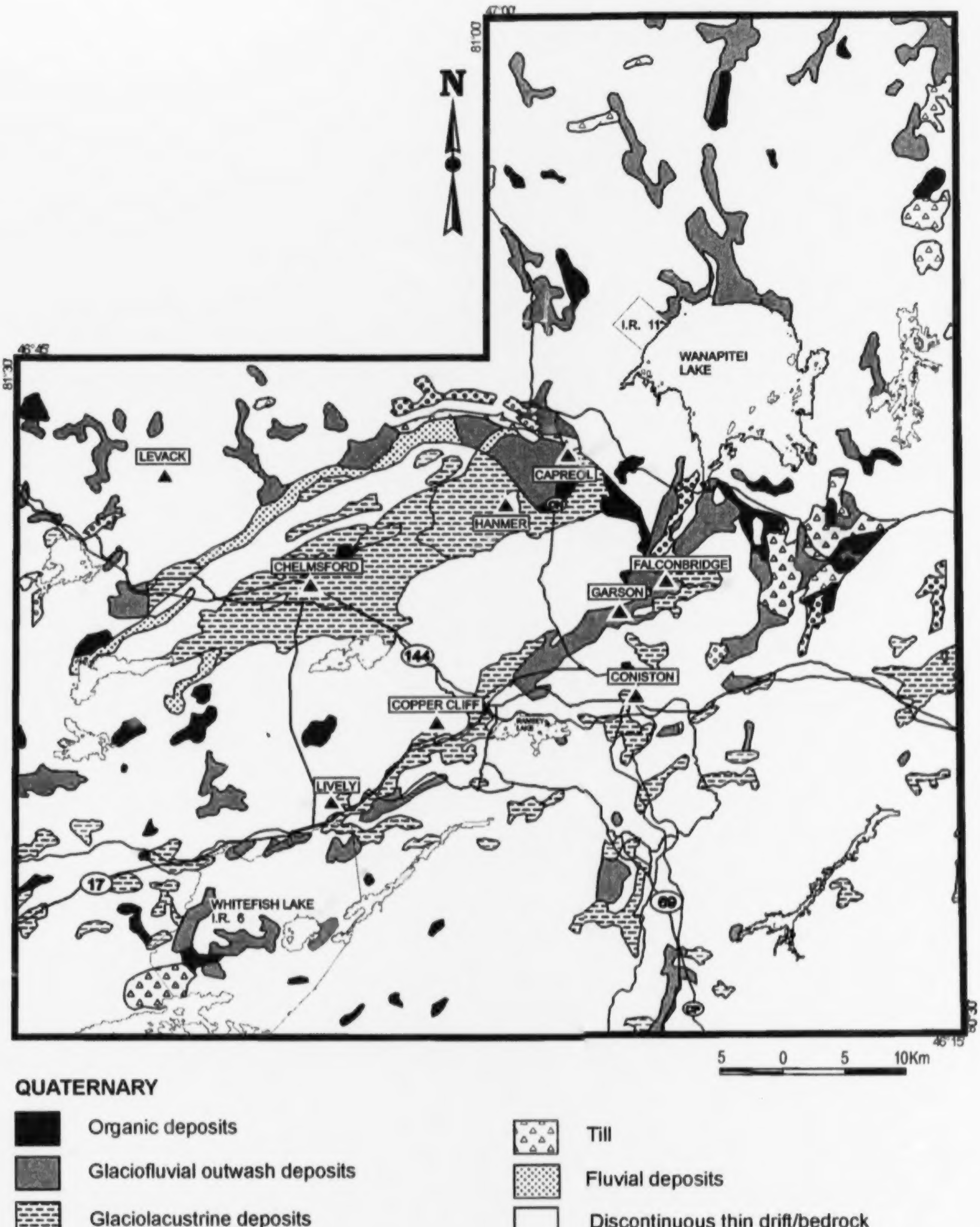

47°00'
81°00'
N
I.R. 11
WANAPITEI LAKE
46°45'
81°37'
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
144
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
69
80°30'
46°15'
5 0 5 10Km
QUATERNARY
Organic deposits
Glaciofluvial outwash deposits
Glaciolacustrine deposits
Glaciofluvial ice-contact deposits
Till
Fluvial deposits
Discontinuous thin drift/bedrock

Figure 3. Generalized Quaternary geology (*after* Barnett et al. 1991).

Historically, more than \$150 billion worth of metals have been produced in the Sudbury area including 21 billion pounds of nickel, and 23 million ounces of PGM (worth \$95 billion and \$11 billion respectively) (B. Greenwell, M. Gaudreau, MNDM, personal communications, 2004). There is a history of 119 years of mining in the Sudbury district.

Exploration interest in the Sudbury area has not always been focussed on Ni-Cu. A gold rush in 1894 focussed on the area surrounding Wanapitei Lake, due to the discovery of gold- and silver-bearing quartz veins. In 1898, a placer gold play along the Vermilion River also occurred (LeBourdais 1953) (F. Brunton, personal communication, 2003: "Sudbury's Hidden Treasures—Evolution and impact of a world-class integrated mining complex" (unpublished manuscript)).

Current exploration on the Sudbury Basin is focussed on the platinum group elements (as well as for nickel and copper) and on the re-evaluation of known Ni-Cu-PGE occurrences. Exploration continues along the Offset Dikes of the Sudbury Igneous Complex (Meyer et al. 2003). Many companies are actively exploring the North Range of the basin. The fact that nickel prices, at the time of writing, stand at a 14 year high may have some bearing on the current level of exploration interest.

Sudbury's Environmental Legacy

Environmental damage in Sudbury and the surrounding area is the result of many factors that over a period of more than a century have destroyed vegetation and contaminated many lakes and rivers. These factors include mining (sulphur dioxide fumigation and metal deposition), intense logging, bush fires, water and wind erosion and enhanced frost action (Winterhalder 1995). In particular, the roast yards that operated on the South Range of the Sudbury Basin from 1888 to 1929 created sulphuric acid fogs that suffocated and burnt vegetation and acidified the surrounding soils, lakes, streams and rivers. The smelter emissions over the years have caused what is commonly referred to as the Sudbury "footprint", visible in Landsat images, visually demonstrating the loss of vegetation in the vicinity of the smelters. Not so visually obvious is that lakes as far away as New Liskeard have also been effected (Neary et al. 1990). The areal extent of vegetation damage in the Sudbury area, determined in the early 1970s, covered a surface area of approximately 720 km^2. The worst damage was in proximity to the smelters in Copper Cliff, Falconbridge and Coniston as evidenced by distinctly barren areas around each (Winterhalder 1995).

Water quality monitoring in the 1970s revealed that 7000 lakes within a 17 000 km^2 area have also been measurably affected by the Sudbury emissions (Dixit et al. 1995). This ecological disturbance is manifested as acidified and metal-contaminated soils, acidified lakes, metal-contaminated lake sediments, direct damage to vegetation (discoloration, reduced growth rate, high metal concentrations in vegetation and mortality). It is likely that these effects have been amplified due to the fact that Sudbury is situated on the Precambrian Shield. The rock offers very little buffering capacity and therefore local soils are sensitive to acidification. The minor amounts of calcareous rock and low carbonate drift materials (Bajc and Hall 2000) present in the area cannot neutralize the acidity formed in the byproducts of Sudbury's mining industry.

Sediment Sampling Methods

A significant mining "footprint" exists in the Sudbury area, which poses a challenge to a survey such as this one, both operationally and scientifically. Operational challenges included the significant cultural (human) presence throughout the region and its effect on the day to day collection of samples. Scientifically, the challenge was to "see" through 119 years of mining and ecological disturbance and understand background geochemical conditions as they would have existed before any industrial activity began. During the mid-1980s, the OGS developed a gravity coring device that allowed for the rapid collection of lake sediments and the reliable discrimination between surface and deep lake sediments (Fortescue 1988). Since then, the equipment and methodology have been updated and refined, such that when using a helicopter, it is now routine to sample an average of 24 lake sites per hour.

Organic lake sediment samples were collected using the OGS sediment sampler (Photo 1) from a helicopter float. In order to avoid any anthropogenic fallout of metals derived from point or non-point sources of pollution and to avoid water–sediment interface effects (i.e., diagenetic cycling of Mn due to anoxic conditions resulting in secondary scavenging or accumulation of base metals), only the deep (older) sediment (>20 cm below the sediment surface) was collected. This deep sediment, which predates industrial activity, closely reflects the natural geochemical inputs to the lake bottom attributable to the geology of the area.

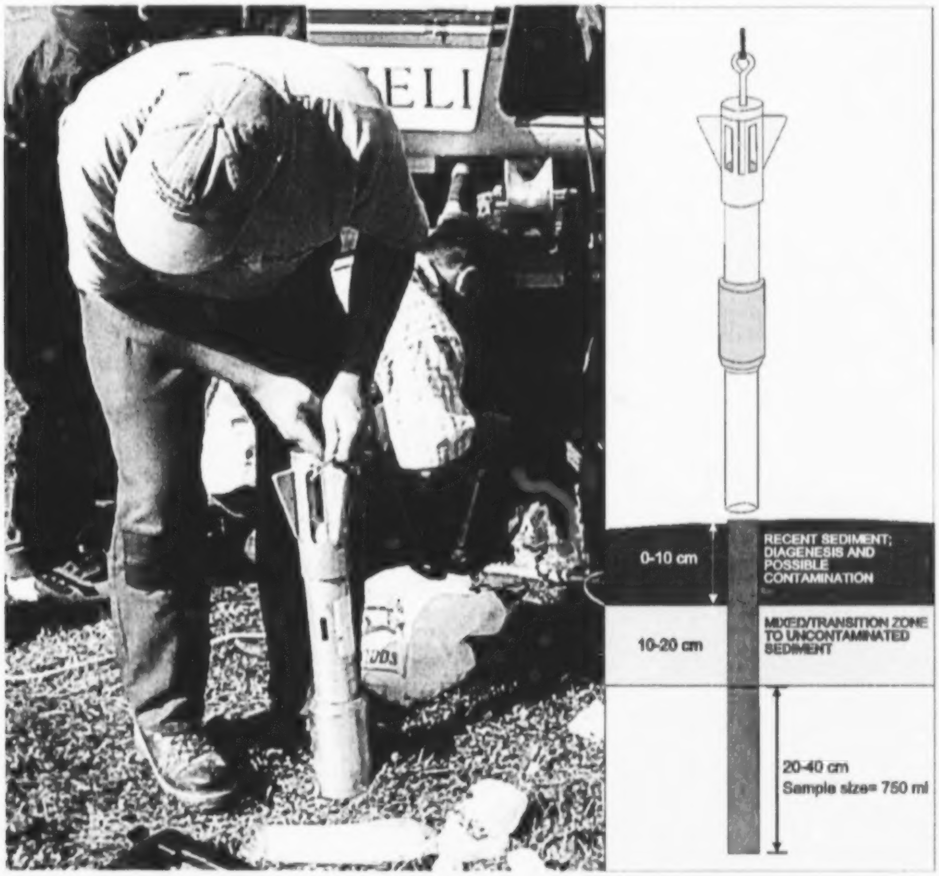

0-10 cm
RECENT SEDIMENT; DIAGENESIS AND POSSIBLE CONTAMINATION
10-20 cm
MIXED/TRANSITION ZONE TO UNCONTAMINATED SEDIMENT
20-40 cm
Sample size= 750 ml

Photo 1. OGS sediment sampling coring device.

Sediment Sampling Methods

A significant mining "footprint" exists in the Sudbury area, which poses a challenge to a survey such as this one, both operationally and scientifically. Operational challenges included the significant cultural (human) presence throughout the region and its effect on the day to day collection of samples. Scientifically, the challenge was to "see" through 119 years of mining and ecological disturbance and understand background geochemical conditions as they would have existed before any industrial activity began. During the mid-1980s, the OGS developed a gravity coring device that allowed for the rapid collection of lake sediments and the reliable discrimination between surface and deep lake sediments (Fortescue 1988). Since then, the equipment and methodology have been updated and refined, such that when using a helicopter, it is now routine to sample an average of 24 lake sites per hour.

Organic lake sediment samples were collected using the OGS sediment sampler (Photo 1) from a helicopter float. In order to avoid any anthropogenic fallout of metals derived from point or non-point sources of pollution and to avoid water–sediment interface effects (i.e., diagenetic cycling of Mn due to anoxic conditions resulting in secondary scavenging or accumulation of base metals), only the deep (older) sediment (>20 cm below the sediment surface) was collected. This deep sediment, which predates industrial activity, closely reflects the natural geochemical inputs to the lake bottom attributable to the geology of the area.

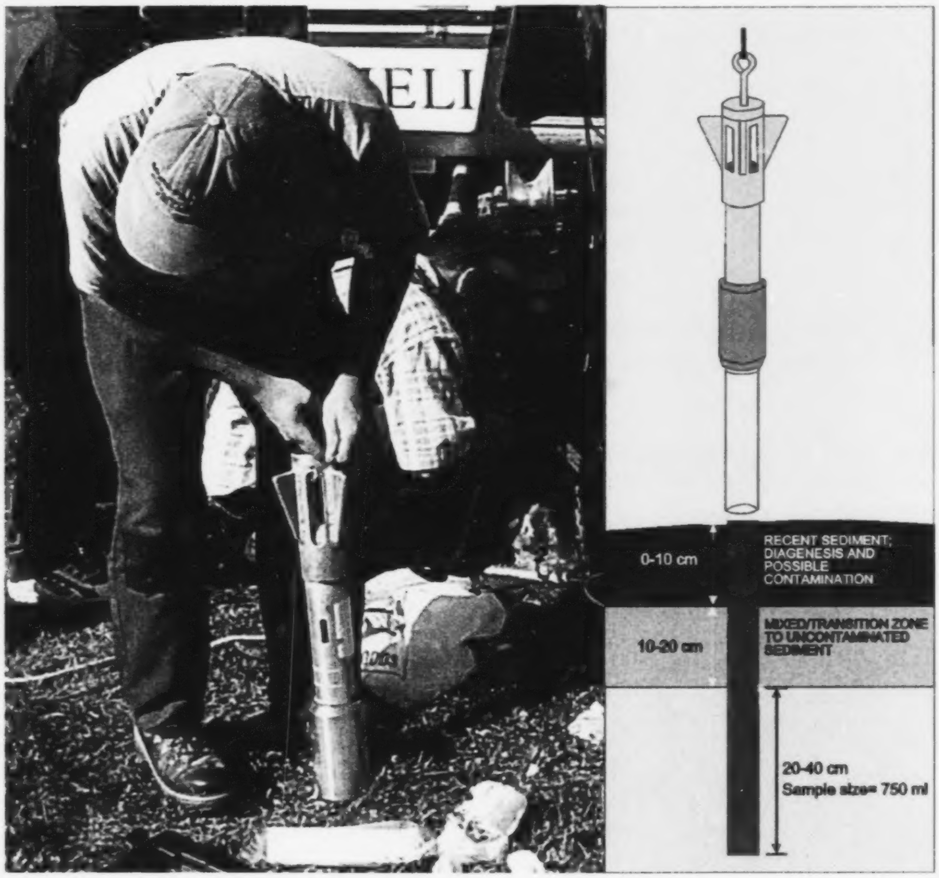

ELI
0-10 cm
RECENT SEDIMENT; DIAGENESIS AND POSSIBLE CONTAMINATION
10-20 cm
MIXED/TRANSITION ZONE TO UNCONTAMINATED SEDIMENT
20-40 cm
Sample size= 750 ml

Photo 1. OGS sediment sampling coring device.

The greater than 20 cm sampling depth has been consistently used by the OGS since the early 1980s. It was initially based on studies by Dickman and Fortescue (1984) and Fortescue et al. (1984) on the rise of *Ambrosia* pollen at a sediment depth of 10 to 15 cm within 8 test lakes in the Sudbury and Wawa regions. This rise in the ragweed pollen *Ambrosia* corresponds to the onset of extensive deforestation associated with agricultural development during the post-industrial period of the past 100 years (Dickman and Fortescue 1984). The age of the *Ambrosia* pollen rise has been verified by ^{210}Pb age determinations of lake sediment cores, including 2 lakes north of Wanapitei Lake (Dickman and Fortescue 1991). At these lakes, the pollen rise occurred between 14 and 17 cm deep with a calculated sedimentation rate of approximately 1.2 mm per year. The standardization to a deeper depth of 20 cm was done to account for variations in sedimentation rates between different landscape environments. More recent studies in the Sudbury area confirm that a sample depth of 18 to 20 cm is adequate to avoid contamination (N. Belzile, Laurentian University, personal communication, 2004). One such study was done in the Sudbury area (Hunt 2003) in which sediment from 14 lakes were cored and the ages determined using ^{210}Pb. The sedimentation rate averaged to 1.6 cm per decade. Therefore, a 20 cm depth in lake sediment corresponds to approximately 125 years ago. Most of the lakes investigated by Hunt's (2003) study were also sampled by the OGS for this project. The pre-1880 sediment chemistry of Hunt's (2003) study compares very favourably with the results of this project (*see also* Table 2 and "Comparison of OGS Lake Sediment Geochemistry with Other Studies").

Water Sampling and Limnological Parameters

Water quality parameters (pH, conductivity, oxidation-reduction potential, dissolved oxygen) were obtained from most lake sites using a YSI water quality analyzer. This was done using a diaphragm pump, plastic hoses and a flow cell. Water was pumped from the lake and allowed to purge the hoses and flow cell prior to the recording of water quality parameters of the water held in the flow cell. The depth of sampling was 0.5 to 1 m in most lakes. At deep lakes (>5 m deep), water was obtained from a depth of 2 m. A depth finder was used to determine lake depths.

A water sample was obtained at each lake after the purging of the supply hose and pump. A "Y" connection before the flow cell was opened and closed as appropriate to fill a clean, new 250 mL high-density polyethylene (HDPE) bottle. Samples were kept cool and shipped in coolers for analysis.

A global positioning system (GPS) receiver was utilized to record accurate sample site positions. Field notes were recorded on standardized forms and entered into a Microsoft® Access database at the end of each day.

Sample Preparation and Analytical Methods

Lake sediment samples were placed in breathable fabric bags and partially air dried prior to shipment to the OGS Geoscience Laboratory (GeoLabs) in batches of 500 to 1000 samples. A total of 1316 sediment samples were submitted to the laboratory. The samples were oven dried at a temperature not exceeding 40°C and dried samples were then disaggregated using a ring and puck pulverizer made of ceramic. Samples were then sieved to obtain the <80 mesh (<177 μm) size fraction.

Laboratory analysis by GeoLabs consisted of aqua regia digestion of 0.5 g of sample pulp followed by inductively coupled plasma mass spectrometry (ICP–MS) and inductively coupled plasma optical emission spectroscopy (ICP–OES) to determine approximately 50 trace elements. Aqua regia digestion attacks all sample matrix constituents, except for silicate minerals, and therefore is considered a nonselective, relatively strong partial extractant. GeoLabs also performed loss-on-ignition (LOI) at 500°C on 0.5 g of each sample pulp, using an automated furnace-gravimetric technique.

Table 1. Sudbury area lake sediment data set, summary of elements analyzed by ICP, FA–ICP–MS and INAA and quality control data, including estimates of precision.

				Lake Sediment (n=1290)				LKSD-1 Reference Standard (n=79)			LKSD-4 Reference Standard (n=82)		
Element	Analytical Method	Units	MDL	Median	RANGE		Estimated Precision	Certified Value	Mean Q.C. Result	Coefficient of Variation (%)	Certified Value	Mean Q.C. Result	Coefficient of Variation (%)
					Min	Max							
Ag	ICP-MS	ppm	0.02	0.10	<0.02	6.34	± 0.08	0.6	0.60	12.3	0.2	0.23	19.1
Al	ICP-OES	ppm	30	10781	68	40981	± 1000	41300	3981	6.8	31200	11711	5.8
As	INAA	ppm	0.5	3.0	<0.5	229.0	± 1.5	40	37.9	3.5	16	16.7	9.8
Ba	ICP-OES	ppm	3.00	98.00	<3.00	750.00	± 10	430	88.60	4.1	330	134.50	4.1
Be	ICP-MS	ppm	0.10	0.55	<0.10	3.69	± 0.7	1.1	0.17	119.6	1	0.44	62.0
Br	INAA	ppm	0.5	36.0	1.8	103.0	± 3	11	11.3	5.4	49	53.0	2.7
Ca	ICP-OES	ppm	15	4732	62	32166	± 500	77200	68769	2.4	12900	9449	3.7
Cd	ICP-MS	ppm	0.050	0.652	0.074	9.1	± 0.2	1.2	1.575	6.2	1.9	2.089	4.9
Ce	ICP-MS	ppm	0.03	47.46	3.44	400.0	± 10	27	17.10	8.3	48	38.68	7.2
Co	ICP-MS	ppm	0.05	6.61	0.61	400.0	± 2	9	7.87	4.3	11	9.08	4.1
Cr	ICP-OES	ppm	4	23	<4	162	± 4	12	13	5.2	21	21	5.2
Cs	ICP-MS	ppm	0.01	0.40	0.04	2.10	± 0.2	1.5	0.52	6.1	1.7	1.11	5.7
Cu	ICP-OES	ppm	5	37	<5	5417	± 2	44	43	6.0	30	30	3.9
Dy	ICP-MS	ppm	0.05	2.96	0.29	30.82	± 0.4	-	1.80	6.2	-	3.00	3.9
Er	ICP-MS	ppm	0.01	1.45	0.16	15.41	± 0.2	-	1.02	7.0	-	1.73	5.2
Eu	ICP-MS	ppm	0.05	1.11	0.10	14.83	± 0.1	-	0.51	8.0	-	0.96	6.5
Fe	ICP-OES	ppm	5	8540	39	148188	± 1500	18000	18811	3.3	27000	25850	3.8
Ga	ICP-MS	ppm	0.05	2.38	0.32	15.44	± 0.5	-	2.17	7.6	-	4.25	5.3
Gd	ICP-MS	ppm	0.05	4.98	0.50	82.49	± 0.8	-	2.49	6.0	-	4.23	5.0
Hf	INAA	ppm	1	2	<1	8	± 1	3.6	4	8.7	2.8	3	3.7
Hg	ICP-MS	ppm	0.05	0.11	<0.05	0.44	± 0.08	-	0.09	40.6	-	0.18	17.9
Ho	ICP-MS	ppm	0.01	0.55	0.06	5.31	± 0.05	-	0.36	6.3	-	0.60	4.2
K	ICP-OES	ppm	100	259	<100	2400	± 150	9100	383	8.2	6600	824	7.0
La	ICP-MS	ppm	0.05	31.44	2.57	350.00	± 4	16	10.66	3.9	26	21.48	3.5
Li	ICP-MS	ppm	0.50	2.84	<0.50	32.43	± 2	7	4.00	9.9	12	9.23	8.4
LOI	Grav.	%	0.01	47.6	10.2	93.3	± 1	23.5	23.40	7.1	40.8	41.23	0.8
Lu	ICP-MS	ppm	0.005	0.17	0.020	2.37	± 0.02	0.4	0.14	9.0	0.5	0.25	4.8
Mg	ICP-OES	ppm	20	1292	10	14149	± 500	10300	6349	3.3	5400	3874	4.2
Mn	ICP-OES	ppm	1	126	<1	15158	± 30	460	413	3.4	430	407	4.2
Mo	ICP-MS	ppm	0.10	1.29	0.10	24.82	± 0.2	12	10.00	4.3	2	1.78	7.0
Na	ICP-OES	ppm	10	61	<10	2857	± 30	14800	282	11.4	5200	205	11.0
Nb	ICP-MS	ppm	0.05	0.50	0.08	2.01	±0.2	7	0.82	17.1	9	1.27	7.0
Nd	ICP-MS	ppm	0.08	30.76	2.32	394.36	± 3	16	12.40	5.0	25	22.44	2.9
Ni	ICP-OES	ppm	5	26	<5	15733	± 5	11	15	5.7	32	33	4.9
P	ICP-OES	ppm	50	1005	<50	4837	± 50	900	737	2.5	1300	1324	3.6
Pb	ICP-MS	ppm	0.05	6.58	1.20	149.48	± 1.0	84	81.16	5.3	93	92.87	3.6
Pd	FA-ICP-MS	ppb	0.3	0.9	<0.3	106.2	± 1	-	-	-	-	0.63	46.2
Pr	ICP-MS	ppm	0.05	7.99	0.62	95.19	± 1	-	2.91	3.8	-	5.65	3.2
Pt	FA-ICP-MS	ppb	0.3	1.1	<0.3	50.8	± 2	-	-	-	-	1.0	81.2
Rb	ICP-MS	ppm	0.05	3.41	0.29	33.86	± 1.5	24	3.61	4.8	28	10.27	4.9
S	ICP-OES	ppm	30	3809	51	31765	± 200	15700	15900	2.9	9900	9800	3.5
Sb	ICP-MS	ppm	0.05	0.11	<0.05	1.58	± 0.05	1.2	0.65	9.8	1.5	1.24	4.8
Sc	ICP-MS	ppm	0.10	2.70	0.24	43.55	± 0.8	9	2.56	9.6	7	4.04	6.4
Sm	INAA	ppm	0.05	5.90	0.80	71.10	± 0.5	4	2.52	6.2	5	5.10	4.5
Sn	ICP-MS	ppm	0.50	<0.50	<0.50	8.64	± 0.25	16	3.16	7.8	5	3.17	9.3
Sr	ICP-OES	ppm	0.10	25.00	0.50	189.00	± 4	250	61.34	4.0	110	38.83	4.0
Ta	INAA	ppm	0.5	<0.5	<0.5	2.5	± 0.7	0.3	0.4	63.8	0.4	0.4	55.6
Tb	ICP-MS	ppm	0.05	0.60	0.06	7.89	± 0.1	0.6	0.33	6.6	1.2	0.55	4.5
Th	ICP-MS	ppm	0.05	0.60	<0.05	13.57	± 0.8	2.2	1.41	7.4	5.1	2.01	7.0
Ti	ICP-OES	ppm	3	113	<3	923	± 120	3010	337	12.6	2270	442	8.5
Tl	ICP-MS	ppm	0.05	0.10	<0.05	0.72	±0.03	-	0.23	5.3	-	0.44	5.4
Tm	ICP-MS	ppm	0.005	0.19	0.020	2.40	± 0.05	-	0.14	9.8	-	0.25	6.2
U	ICP-MS	ppm	0.05	2.09	0.18	89.09	± 0.3	9.7	8.73	3.8	31	30.28	3.3
V	ICP-OES	ppm	5	22	<5	425	± 3	27	21	5.5	32	32	4.7
W	ICP-MS	ppm	0.05	0.07	<0.05	1.17	± 0.08	<4	0.66	26.8	<4	0.25	30.0
Y	ICP-MS	ppm	0.05	14.42	1.40	151.23	± 1	19	10.60	5.5	23	16.98	3.9
Yb	ICP-MS	ppm	0.05	1.16	0.13	14.99	± 0.2	2	0.91	7.8	2	1.61	5.1
Zn	ICP-OES	ppm	2	67	<2	983	± 6	337	332	3.1	189	183	3.1
Zr	ICP-MS	ppm	0.10	0.43	<0.10	13.51	± 1	134	1.66	26.1	105	0.99	21.4

Notes:

1. ICP–MS = Inductively Coupled Plasma Mass Spectroscopy (aqua regia digestion)
2. ICP–OES = Inductively Coupled Plasma Optical Emission Spectroscopy (aqua regia digestion)
3. INNA = Instrumental neutron activation analysis
4. MDL = method detection limit
5. Estimated precision at 95% confidence level: ICP–MS, FA–ICP–MS, INAA and OES elements based on results of 143 duplicate pairs.
6. Q.C. Result = Average value obtained, Sudbury area survey
7. Coefficient of variation at one standard deviation (68% confidence level)
8. LKSD-1 and LKSD-4 are CANMET certified reference materials. For ICP elements, quoted reference values for Ag, As, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, V, Zn determined by partial digestion; all other ICP elements determined with total digestion. For INAA elements, quoted reference values for LKSD-1 and LKSD-4 are from total digestion methods.
9. Statistics for LKSD standards based on all LKSD QC samples inserted into Sudbury–Temagami project

Becquerel Laboratories Inc. was contracted to perform instrumental neutron activation analysis (INAA) using epithermal irradiation. Approximately 10 g of each sample pulp was pressed into a briquette prior to INAA for Au, As and a suite of 25 other elements. There was sufficient material to analyze 1274 samples by INAA.

Activation Laboratories Ltd. was contracted to perform low-level Au and PGE analysis by fire assay with ICP-MS finish. After all other analysis was complete, a total of 1121 samples had sufficient material available (>5 g) for FA–ICP–MS analysis.

Quality Control Results

Quality control and quality assurance (QC, QA) in the field are crucial to a successful geochemical sampling program. Quality control involves: 1) proactive measures at the time of sample collection; and 2) quality assurance procedures at all stages of the sample collection–handling–analysis process. To ensure that OGS protocols were adhered to, a rigid quality assurance program was instituted to ensure the integrity of samples collected and data acquired. The program involved 4 components:

1. A mandatory information and training session for the contractor prior to the commencement of field work. Follow-up information sessions and/or field visits by the OGS staff were done to ensure all aspects of sample protocols and requirements were understood and were implemented by the contractor.
2. The collection of method (field) duplicates by OGS staff at approximately 2% of lakes sampled. This procedure was intended to provide a fair determination of the contractor's performance with respect to sample collection and handling techniques, maintenance of water quality measuring equipment and recording of sample site locations. Field duplicates were sequenced-in with the Quality Control samples following field work.
3. The insertion of Quality Control samples by the OGS, including method (field) duplicates, homogenized sample duplicates and certified reference standards (to determine laboratory accuracy) into the sample sequence between sample preparation and laboratory analysis. Sample numbers were altered to prevent detection of quality control samples by the laboratory. Quality control (QC) samples were inserted into the sample sequence at the rate of 1 QC sample per 10 unknowns. The QC sediment samples consisted of field duplicates, analytical (pulp) duplicates, certified reference standards (CRS) and 2 internal (OGS collected) bulk standards. Field (method) duplicates were inserted with a frequency of 1 in 40. Analytical pulp duplicates were prepared by halving 1 in 40 of the dried sample pulps and inserting them into the sample sequence. CANMET certified reference standards (LKSD-1 and LKSD-4: Lynch 1990) and 2 OGS internal standards were also inserted as dried pulps between the sample preparation and analysis stages. On average, every 20th sample was either a CRS or an OGS internal standard.
4. Monetary penalties to the contractor for the collection and/or submission of inorganic samples and inadequate sample size.

Table 1 contains a summary of the elements analyzed, including some basic statistics of the geochemical data sets and quality control data, such as estimates of precision and coefficients of variation for the certified reference materials. A complete listing of all data used to prepare these tables is contained in Miscellaneous Release—Data (MRD) 131, which is published separately from this report.

Analytical precision for each element was determined by plotting duplicate data on an X–Y chart and determining the variation of 95% of the data from a 1:1 ratio. Accuracy was determined by plotting the sequential values returned for certified reference standards inserted in the batch against a vertical scale of concentration and comparing this with the "provisional values" (Lynch 1990) for the standards. The mean and standard deviation of values returned for each standard were also compared with the provisional values.

The quality of the ICP–MS and OES data sets is excellent. The determinations of all metals (e.g., Cu, Cr, Ni, Co, Pb, Zn) in the QC samples displayed excellent precision and accuracy. The QC results for the certified and in-house standards for the lithophile elements Be, Hf, Nb, W and Zr were somewhat erratic, as evidenced by their relatively high coefficients of variation contained in Table 1. This behaviour is largely due to the variable and often incomplete digestion of the silicate phase by aqua regia prior to analysis by ICP. This incomplete digestion is demonstrated by the low mean levels returned for many of the lithophile major and minor elements shown in the LKSD-1 and LKSD-4 results of Table 1. For example, the certified level of aluminum (Al) in LKSD-1 is 41 300 ppm obtained by total digestion (Lynch 1990). The mean result for Al in LKSD-1 obtained by this study was 3981 ppm via the "near total" aqua regia digestion.

The multi-element ICP–MS scan included the determination of Hg. Although the sample preparation and analysis methods employed by this survey were not optimal for Hg determinations (i.e., some samples were inadvertently dried at a high enough temperature to volatilize Hg into the atmosphere), the QC screening indicates the data set is acceptable for publication and therefore is included in this report and the digital data release.

The results of the QC screening of the INAA data set indicated that Au was of insufficient quality for publication. Conversely, arsenic (As) by INAA was of superb quality, in both accuracy and precision. The estimated precision for As, from the analysis of duplicate pairs, was ±1.5 ppm. With regard to the rest of the INAA elements, no QC issues were detected and all data are published in MRD 131.

As with Au by the INAA method, the QC results for Au by FA–ICP–MS also indicated unacceptable precision. The estimated precision of ±7 ppb, determined by the analysis of over 100 blind duplicate pairs, was significantly worse than that achieved in previous OGS experience. Conversely, the precision of the FA–ICP–MS elements Pt and Pd was very good. The estimated precision for Pt and Pd were ±2 and ±1 ppb, respectively. This compares very favourably with previous OGS experience.

Discussion of Limnological Parameters: Water pH and Conductivity

The Sudbury survey area lies within an area affected by industrialization, agriculture and urbanization as well as comparatively pristine forested land. Therefore, the natural background chemistry of the lakes and waterways has superimposed on it signatures of urbanization (high salt and nutrient loadings) and industrialization (low pH and high metal concentrations) (Gunn and Keller 1995). The regional variations in pH and conductivity of the lake waters reflect the diversity of land use in the Sudbury survey area. Lakes within urban and industrialized areas are characterized by high electrical conductivity (EC): values range from 200 to greater than 3000 μS/cm. The proportional dot diagrams (Appendix A) show a strong correlation between pH and conductivity, however, many lakes in the industrialized areas of Sudbury show high EC with very low pH values. In general, a good correlation exists with the bedrock geology and surficial geological material where the impacts of industry and human activities are minimal. These areas are located in the northeast, southeast and southwest corners of the surveyed area.

The mean values for pH and electrical conductivity for water samples collected in the survey area are 5.4 and 64 μS/cm, respectively. The pH values range from 3.1 to 9.7 and give a median equal to the mean value of 5.4. The EC values range from 11 to 3116 μS/cm and give a median value of 28 μS/cm. The lack of correspondence between the mean and the median indicates skewness in the conductivity data and reflects the diversity in land use of the Sudbury survey area.

Lakes within urban areas and adjacent to mine properties are characterized by high EC. The lakes situated on the Sudbury Igneous Complex (SIC) are characterized by the range of pH and EC present in the survey area as a whole (pH = 3.1 to 9.7 and EC = 11 to 3116, n = 147). The pH and conductivity plots in Appendix A show that lakes in the South Range tend to have neutral pH and higher EC values, compared to those in the North Range.

The glaciofluvial outwash deposits found in pockets within the survey area are characterized by pH ~6 and low EC, 20 to 100 μS/cm. However, the outwash plain in the area of the Sudbury Regional Airport, extending from Boland's Bay to Sudbury has higher pH (mean = 7.1) and EC (mean = 267μS/cm) values. This pattern of high EC values in (comparatively) alkaline lakes associated with Quaternary deposits is not evident elsewhere in the Sudbury region where the outwash material tends to be thin and discontinuous.

The few lakes of high pH that are associated with extremely high EC levels are located in the Levack area and straddle Levack and Dowling townships. These lakes are situated on the bedrock of the SIC. Lakes with high EC (>1000 μS/cm) and anomalously low pH were later identified as polishing ponds proximal to mine properties (sites 188, 743, 1285).

Another significant cluster of lakes with pH >7 lies south of the Kelly Lake–Ramsey Lake area. These lakes display moderate to high EC and are found in populated areas, adjacent to roads and at the junctions of major highways.

The felsic intrusive rocks of the south-central part of the survey (Tilton and surrounding townships), are characterized by lakes with a mean pH of 4.4 to 4.7 and EC of 27 to 28 μS/cm (84 sites). Five anomalous sites of pH 6 to 7 and EC 100 to 629 μS/cm occur in Denison Township and are probably related to activities of the local mines (Worthington and Victoria mines).

The lakes of the southeastern portion of the survey area, underlain by gneissic rocks of the Grenville Province, are characterized by lakes with a mean pH of 5.8 and EC of 34 μS/cm. Higher values of EC, ranging from 34 to 221 μS/cm can be attributed to the nearby glaciolacustrine sand and gravelly sand deposits.

The lakes in the Sudbury survey area tend to be acidic (low pH) and have low electrical conductivity except where urbanization, associated road salt runoff, and intense industrial use are the primary land use activities. At least 3 populations of EC were discerned from the data set: low EC (bedrock background signature); moderate EC (urban input); and high EC (effects of mining activities such as tailing ponds, etc). The pH variation is less conclusive because of the unnatural and extreme values observed close to highly industrialized areas, and the opposing response by some lakes to acidification (Dixit et al. 1995).

The water quality results of this survey are supported by other studies in this area (City of Greater Sudbury 2001, 2003). The quality control protocols showed similar trends in the pH data, however, the field pH was consistently lower than the laboratory pH (G.A. Speirs, Centre for Environmental Monitoring, Laurentian University, unpublished data, 2003).

Comparison of OGS Lake Sediment Geochemistry with Other Studies

BACKGROUND

Higher levels of some metals in the first 5 to10 cm of organic-based lake sediments is well documented (Coker et al. 1979; Dyer et al. 1996; Friske 1995; Johnson et al. 1986). In order to more accurately assess natural geochemical variation in the lake sediment column, some studies have employed normalization of data to an immobile constituent, such as Al and/or Ti (Friske 1995; R.D. Dyer, OGS, unpublished data, 2003). Such work has shown that, on average, the elements with the most significant natural enrichment in the upper (surface) lake sediment, relative to the deep sediment, are As, Co, Mn, Mo, Pb and Sb. The degree of enrichment depends on the limnological environment (e.g., water pH, oxidation–reduction potential, anerobic–aerobic conditions and lake depth), therefore element partitioning at the sediment–water interface can vary from lake to lake.

The upward migration and precipitation of Fe and Mn toward the sediment–water interface is a well documented behaviour (Coker et al. 1979; Bendell-Young et al. 1989; Friske 1995). Cobalt (Co) and Pb are 2 of several elements that can be preferentially scavenged and co-precipitated with Mn, also resulting in enrichment in the upper surface sediment. Lead (Pb) enrichment in surface lake sediment has also been attributed to non-point source atmospheric fallout (e.g., Fortescue and Dyer 1994; Johnson et al. 1986). Higher levels of Mo and Sb in surface sediment may be related to several factors. These include sorption (scavenging) by hydrous oxides of Fe and Mn, affinity for organic sediment (which tends to be higher in the surface sediment) and anthropogenic input.

Studies, such as Johnson et al. (1986), Rasmussan (1993) and Dyer et al. (1996), have shown that mercury is often at higher levels in surface lake sediment relative to deep sediment. These same studies have shown that LOI levels are higher in the surface sediment, which is a reflection of a higher organic content than that of the deep sediment. Since mercury has a strong association with organic matter (Jonasson 1976; Rasmussan 1993), this may, at least partially, account for the increased levels in surface sediment. Another potential factor is atmospheric fallout.

The studies cited above that included arsenic data demonstrated that As is also enriched in surface lake sediment relative to deep (>20 cm) sediment. This difference is greater at deep lakes where often a hypolimnion has developed, pH is lower and limnological conditions tend towards anoxic. Although, in general, such conditions do not favour the precipitation of trace elements into the upper sediment, it has been demonstrated that under typical anoxic sediment conditions, arsenic diffuses upwards, towards the sediment–water interface (Ascue et al. 1994; Friske 1995), resulting in a concentration gradient towards the sediment surface.

COMPARISONS

As mentioned previously, critical to this project was the ability to consistently sample deep sediment in order to avoid the natural surface sediment enrichment of some elements (discussed above) and anthropogenic effects (pollution), whether from surface runoff or atmospheric fallout. Hunt (2003) sampled deep pre-industrial (pre-1880) sediment from 14 lakes in the Sudbury region. The sediment was retrieved with a coring apparatus and ages determined using ^{210}Pb. Eleven (11) of these lakes were sampled by the OGS during this project; a comparison of the data is contained in Table 2. Although a "total" digestion method was employed by Hunt (2003) versus this study's "near-total" (aqua regia) digestion, previous OGS experience, as well as that of others (Cook and McConnell 2001; Lynch 1990) indicate that an aqua regia digest of lake sediments is virtually total for most trace metals. The results of the analysis of certified lake sediment reference materials, shown in Table 1, indicate excellent accuracy for most trace metals, and, in particular, those of the most interest to this study.

The comparison of element levels in Table 2, with the exception of a few major and minor elements (K, Mn, Na, P and Ti) shows similar levels between the OGS sampling and Hunt's (2003) results. These results indicate that the OGS sampling methodology is successful at obtaining and discriminating between recent sedimentation and pre-industrial sedimentation.

Under the National Geochemical Reconnaissance (NGR) program, the Geological Survey of Canada (GSC) has previously published lake sediment geochemical data for the Sudbury region (Hornbrook and Friske 1988; Friske et al. 1994, 1997). Those lake sites for which lake sediment data exist for both surveys were compared. Any sample sites with a significant discrepancy in reported lake depth or LOI were screened out of the comparison data set and a visual check was done to ensure both sites were located within the same basin of the lake. The resulting database revealed that many trace metals obtained by the current OGS survey are considerably muted in comparison to the NGR data. For example, Figure 4 shows Ni in lake sediment from lakes sampled by both the OGS and NGR programs. Despite the differences in sample density, it is clear that many of the NGR samples contained significantly higher levels of Ni than the OGS sampling. The treatment and analysis of the samples from each survey were very similar including the use of an aqua regia digest.

Another comparison of the NGR and OGS data sets is shown in Figure 5. For both surveys, the analyses for Pb, Ni and Cu were combined for each lake. A ratio was calculated (NGR Pb+Ni+Cu : OGS Pb+Ni+Cu) and the results plotted as proportional squares. The largest squares represent lake sites where the NGR survey obtained over 6 times the level of combined Pb+Ni+Cu than did the OGS survey. Conversely, the star symbol indicates sites at which the OGS results were more than 20% higher than the NGR data. Of the 190 lakes shown on this figure, only at 8 lakes did the OGS obtain higher combined levels of these metals and only 2 of these exceeded 50% higher.

The differences between the 2 data sets demonstrates the ability of the OGS methodology to reliably and consistently obtain deep, undisturbed, uncontaminated sediment. The NGR lake sediment sampler, commonly known as the Hornbrook sampler (Friske 1991), was not designed to reliably discriminate between shallow and deep sediment. Its ability to do so relies on the depth penetration into the lake bottom. The entire 72 cm sampler must completely penetrate the bottom mud in order to be sure that the material retrieved is from a depth greater than 20 cm. Clearly, this was not possible on many lakes in the Sudbury region. Additionally, a butterfly valve in the nose of the sampler serves to disturb the sediment during penetration of the lake bottom.

Table 2. Comparison of deep (pre-industrial) lake sediment (Hunt 2003) and OGS survey (OGS, this study) samples, Sudbury region.

Lake Name	Sediment Depth (cm)		^{210}Pb Age	Mean Pre-1880	LOI %		Al (ppm)		Ba (ppm)		Ca (ppm)		Co (ppm)		Cr (ppm)		Cu (ppm)		Fe (ppm)	
	Hunt	OGS	(Ma)	Deposition Rate	Hunt	OGS	Hunt	OGS	Hunt	OGS	Hunt	OGS	Hunt	OGS	Hunt	OGS	Hunt	OGS	Hunt	OGS
				(cm/decade)																
Blue Lake South	28.0 (n=6)	>20	1841	1.58	29	27	12166	12194	83	56	4383	3590	19	15	61	48	67	55	17667	22404
Blue Lake North	39.6 (n=4)	>20	1845	2.51	35	34	15000	13514	118	68	3675	3509	25	14	50	48	60	75	22000	22397
Capre Lake	40.4 (n=6)	>20	1493	0.5	28	35	12167	8969	90	77	2900	5154	20	19	66	49	302	223	23800	9212
Little Amy Lake	31.8 (n=1)	>20	1878	1.71	40	19	9000	6785	48	76	3100	2090	12	12	24	31	70	138	6400	7926
Ella Lake North Basin	27.4 (n=4)	>20	1861	1.6	30	29	15750	13278	100	60	3975	4421	19	14	74	70	86	63	26000	20089
Ella Lake South Basin	34.0 (n=6)	>20	1800	1.83	39	38	15000	10548	135	50	5550	4944	22	9	44	38	82	55	26667	12250
Roland Lake	36.9 (n=4)	>20	1839	2.5	37	28	13250	10498	269	114	3425	3073	38	17	53	39	144	74	26500	12154
Waddell Lake	35.2(n=6)	>20	1812	1.6	22	30	15667	15372	86	56	4725	4733	26	12	53	51	92	115	22500	23499
Selwyn Lake	34.4 (n=6)	>20	1776	1.49	41	50	19333	18838	140	141	6483	7395	42	28	40	31	37	42	40500	35241
Skynner Lake	41.6 (n=6)	>20	1795	1.64	62	62	15333	15210	262	131	4450	6713	43	14	28	23	41	49	47167	16669
Cache Lake	38 (n=6)	>20	1709	1.12	48	30	9292	7642	183	111	6683	9326	8.8	11	31	56	64	41	12667	10057

Lake Name	K (ppm)		Mg (ppm)		Mn (ppm)		Na (ppm)		Ni (ppm)		P (ppm)		S (ppm)		Ti (ppm)		V (ppm)		Zn (ppm)	
	Hunt	OGS	Hunt	OGS	Hunt	OGS	Hunt	OGS	Hunt	OGS	Hunt	OGS	Hunt	OGS	Hunt	OGS	Hunt	OGS	Hunt	OGS
Blue Lake South	915	362	3383	3902	377	303	270	111	42	54	1300	1016	4283	2320	157	348	48	32	74	88
Blue Lake North	1125	404	2600	3529	658	326	195	104	42	76	1925	1316	2875	2698	670	250	65	39	74	77
Capre Lake	1600	447	3550	3349	197	173	172	90	353	441	2267	873	4917	4259	720	172	38	27	70	72
Little Amy Lake	440	291	950	1830	96	59	62	83	27	47	910	280	5500	4024	220	211	23	25	75	67
Ella Lake North Basin	1350	491	4075	4805	630	324	235	135	78	80	2350	1428	2725	2292	675	288	57	34	95	84
Ella Lake South Basin	952	318	2400	3012	682	197	240	89	67	63	2233	942	3583	3671	495	202	68	21	89	71
Roland Lake	969	431	2188	3284	499	261	168	88	156	97	1675	1015	7950	3244	485	253	43	27	103	88
Waddell Lake	1567	404	3600	3552	949	229	256	104	155	123	1550	1628	1992	3245	857	188	55	44	90	87
Selwyn Lake	1233	351	2400	1905	900	701	223	106	30	38	2100	2161	3300	3649	602	164	76	68	97	87
Skynner Lake	523	239	548	904	1383	775	58	44	3	31	4250	2239	6650	6015	250	103	45	38	81	87
Cache Lake	854	422	1467	1939	235	413	993	95	26	39	1417	548	7058	4749	353	161	58	30	130	87

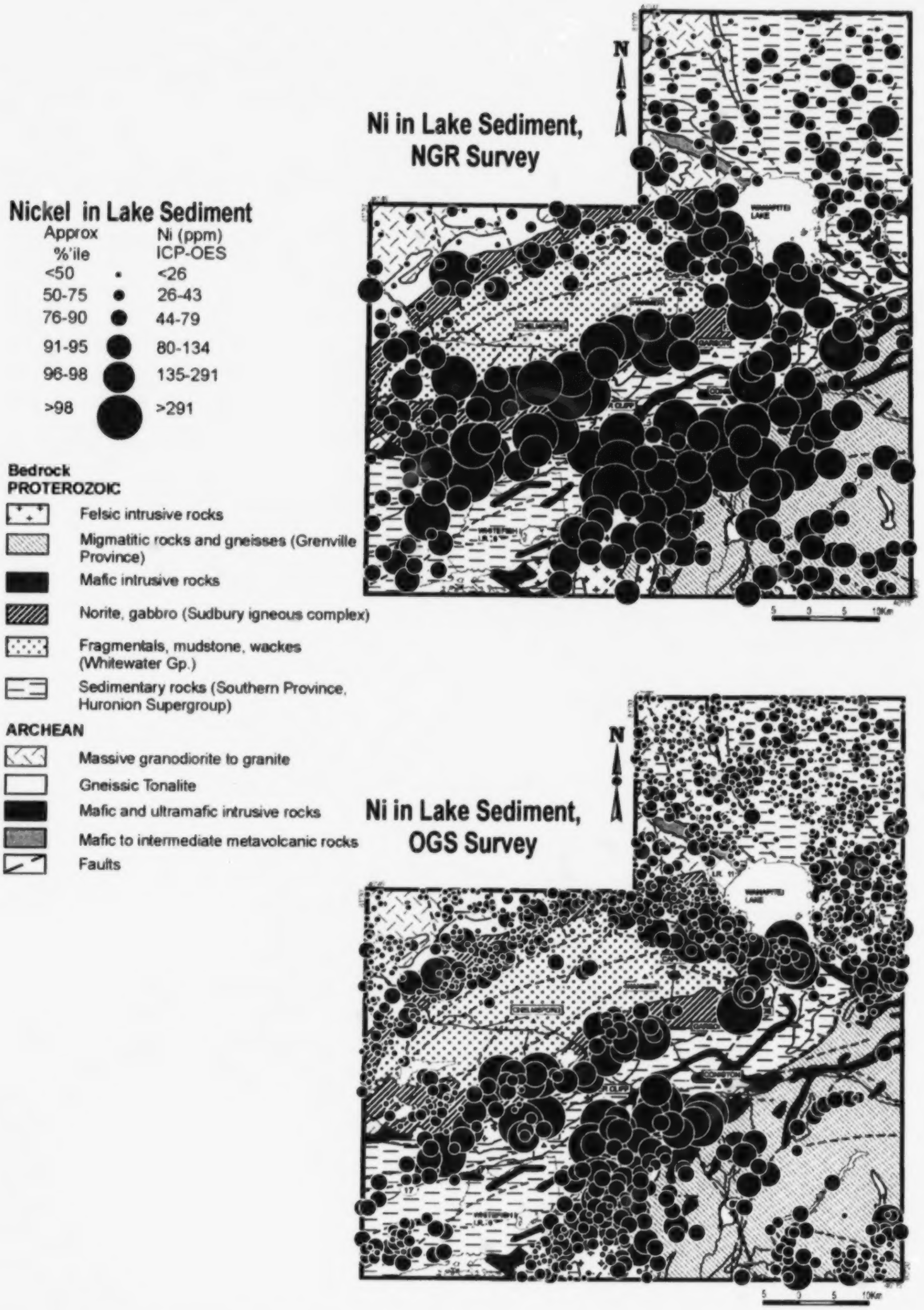

Ni in Lake Sediment,
NGR Survey
Ni in Lake Sediment,
OGS Survey
N
Nickel in Lake Sediment
Approx %'ile
Ni (ppm) ICP-OES
<50
<26
50-75
26-43
76-90
44-79
91-95
80-134
96-98
135-291
>98
>291
Bedrock
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults
5 0 5 10Km
5 0 5 10Km

Figure 4. Comparison of Ni in lake sediments from the National Geochemical Reconnaissance (NGR) program and Ontario Geological Survey (OGS) data sets.

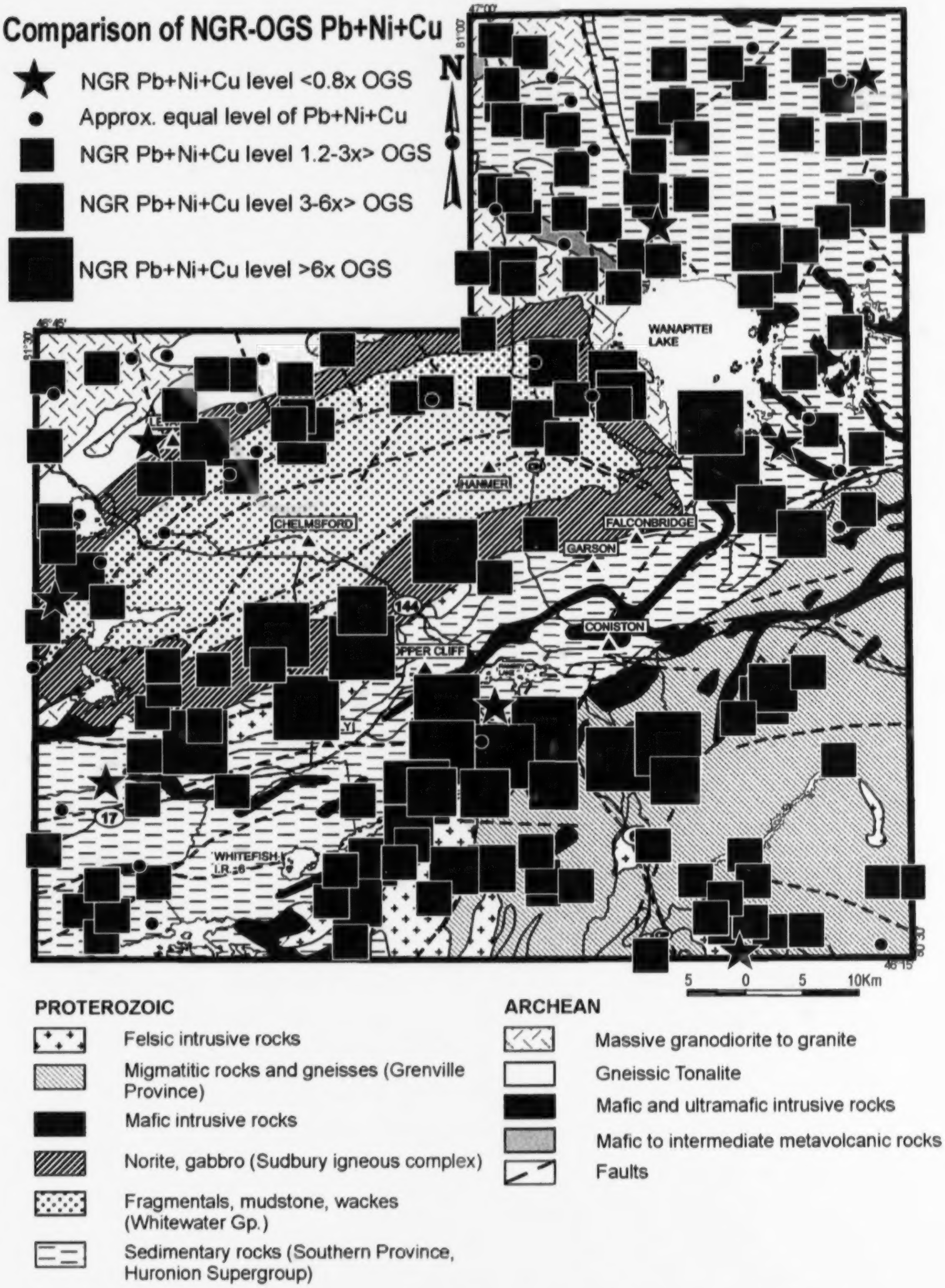

Comparison of NGR-OGS Pb+Ni+Cu
NGR Pb+Ni+Cu level <0.8x OGS
Approx. equal level of Pb+Ni+Cu
NGR Pb+Ni+Cu level 1.2-3x> OGS
NGR Pb+Ni+Cu level 3-6x> OGS
NGR Pb+Ni+Cu level >6x OGS
N
47°00'
81°00'
46°45'
81°30'
46°15'
80°30'
WANAPITEI LAKE
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
PPER CLIFF
WHITEFISH I.R. 6
144
17
5
0
5
10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

Figure 5. Plot of NGR survey (Pb+Cu+Ni) : OGS survey (Pb+Cu+Ni) analyses in lake sediments (*see* "Comparisons" section in text for further information).

General Considerations for Lake Sediment Geochemical Data Interpretation

Factors to consider when assessing the possible significance and validity of lake sediment geochemical anomalies are as follows:

1. CORRELATION WITH BEDROCK GEOLOGY

In mineral exploration, correlation with bedrock geology is the most important factor when assessing the significance of a surficial geochemical anomaly, however, its relative importance declines as the known level of detail of the bedrock geology declines. The Sudbury area has a long history of mining and mineral exploration, therefore there is no shortage of detailed mapping throughout the region.

2. MULTI-SITE ANOMALIES

Multi-site anomalies provide separate verification of the “anomalousness” of a given area and provide some insurance against non-systematic errors in sample quality, collection, preparation or analysis. However, since samples are collected, prepared and analyzed in sequence, a uniform and numerically sequential anomaly may be the result of a systematic analytical or sample preparation error. This might be expected to produce an apparent geographic grouping of fairly uniform concentrations in one, or possibly several, elements. Every effort has been made to detect this kind of problem, but the user is reminded to consider all available data when assessing the importance of an anomaly.

3. MULTI-ELEMENT ANOMALIES

Multi-element anomalies with geologically reasonable elemental assemblages are useful in assessing the importance of many anomalies. For example, Pt and Pd, which are relatively immobile in the surficial environment compared to base metals such as Cu, Ni, Pb and Zn, would not normally be expected to be found in anomalous levels in a lake sediment without an accompanying base metal signature. However, certain multi-element anomalies (e.g., Mo + Zn) can sometimes result from limnological factors (e.g., redox conditions related to deep lakes, relative level of organic material in the sediment).

4. MAGNITUDE OF THE ANOMALY

The magnitude of an anomaly, perhaps surprisingly, is one of the least important assessment criteria. Magnitude depends not only on the size of a deposit or occurrence but on its distance from the lake, the presence and effectiveness of sinks between the source and lake, the limno-geochemical conditions in the lake, the weatherability of the deposit and the character of the surficial deposits (i.e., level of carbonate). The weatherability depends on factors such as exposure and/or depth of burial and on the specific mineralogy of the source. All these factors combine to make magnitude an unreliable estimate of the importance of an anomaly except in extreme cases or in cases where multiple samples and/or media corroborate its importance.

5. CORRELATION WITH SURFICIAL GEOLOGY

Unconsolidated deposits can, under certain circumstances, cause a greater impact on the chemistry of lake media than can bedrock. Carbonate materials within eskers and thick ice-contact stratified drift deposits often result in relatively hard, alkaline lake waters. This type of lake water provides a geochemical matrix for trace elements, which is very different to that of most shield lakes which are mildly acidic and organic-dominated. In general, most metals are relatively immobile in such alkaline conditions, therefore, geochemical anomalies might be considered more significant and perhaps relatively close to source.

Dilution or addition to the trace metal signature in sediments can occur due to the presence of fine-grained unconsolidated material, such as silt or clay. Often a spatial relationship can be seen between lake sediment anomalies and glaciofluvial deposits such as eskers. In general, the sample collection and preparation protocols employed by the OGS, when properly carried out, minimize the deleterious effects of exotic inorganic materials that may be present in the survey areas.

6. REDOX CONDITIONS, LAKE DEPTH AND ORGANIC CONTENT

Not all spatial trends in geochemistry are due to lithological or mineralogical factors. The solubility of trace metals depends to a large extent on the geochemical matrix and, in particular, on pH and oxidation–reduction (redox) conditions. Redox conditions in a lake are usually controlled by thermal conditions, which, in turn, are controlled by lake morphology and lake depth. If conditions are suitable for an element to preferentially partition into the lake sediment, factors that may influence (enhance) the concentration of the element include the abundance of Fe, Mn and organic material. The mechanisms that may lead to "false anomalies" include sorption (scavenging) by hydrous oxides of Fe and Mn and the affinity of some elements to form organo-metallic complexes. Enrichment of some elements in the shallow (surface to 10 cm deep) sediment due to the upward migration and precipitation or concentration of Fe and Mn (and other trace elements such as Co, Pb, Mo and Zn originally co-precipitated with Fe and Mn) can occur. The OGS sampling technique avoids the surface sediment and targets the deep (>20 cm) sediment thereby reducing or minimizing the effects of Fe, Mn and base metal enrichment that may occur in the surface sediment, whether by diagenetic cycling or by anthropogenic input. This assumes a similar sedimentation rate in all of the sampled lakes and that the lake sediments deposited over the past several hundred years being undisturbed. This may not always be true. Sedimentation rates can vary depending on the energy of and the input to the depositional environment. Other factors to consider are sediment slumpage or mudslides, the effects of wavebase and the activities of animals. Therefore, the inadvertent collection of some "mixed" (shallow and deep sediment) samples is unavoidable.

Discussion of Regional Lake Sediment Geochemical Patterns

The 3 most important factors controlling the regional deep lake sediment geochemical patterns over the Sudbury survey area, in order of importance, are geology, variations in bulk composition of the sediment (relative proportions of organic and inorganic material estimated by LOI) and local cultural and mining disturbances. Since only deep (>20 cm) organic-based sediment was sampled, the effects of airborne fallout of particulate matter were avoided. The possible exception to this are lakes with a much higher sedimentation rate than average or lakes containing disturbed sediment. The former is possible in the Sudbury area, particularly in areas where the damage to vegetation has been highest, typically near the 3 smelters that have operated in the region. The latter—lakes with disturbed sediment—may be shallow lakes (<2 m deep) which have been effected by wavebase or animals such as moose; or lakes of any depth which have had tailings, slag or rock waste deposited in or near them.

Lake sediment organic content (estimated by LOI) across the region displays a general trend of higher levels across the northern third of the study area. In particular, the lakes over the granitic terrain north of the SIC and over the Cobalt Group (Huronian Supergroup) sediments seem to have a higher proportion of organic content compared to the lakes over Grenville and Southern Province (Elliot Lake Group, Hough Lake Group and Quirke Lake Group) rocks in the south. That Huronian (Cobalt Plain) sediments, on average, have lakes with higher LOI was also observed by Fortescue and Dyer (1994). The regional patterns for the lithophile elements Al, Cr, Cs, K, Li, Mg, Nb, Rb and Ti show higher levels coincident with low LOI lakes in the southern third of the study area. Conversely, the elements Br and Mo display a trend of higher levels in the northern third of the study area. In the case of Mo, other factors besides LOI (organic content) control its accumulation in lake sediment. The association of bromine with organic content has been noted in other studies (e.g., Fortescue and Dyer 1994).

A broad area of anomalous Ba, with partially coincident Be-Co, occurs over Huronian sediments north of Wanapitei Lake. The pH of lake waters throughout most of this northern portion of the survey area are acidic (commonly pH <5.0). This discrete zone of Ba enrichment suggests a source for Ba-Be exists in the bedrock. The lack of corresponding levels of elements typically associated with Ba (e.g., Th, Rb Ca, Pb) is unusual. The Mineral Deposit Inventory (MDI) database does not show any Ba occurrences in the area. These results are not the result of an analytical batch error, as no problems were detected by the quality control program. To the east of this Ba anomaly, a zone of anomalous Sb-Mo is present. Slightly less acidic lake waters, lower average lake depth and higher organic content may be partially the reason for this pattern.

Another prominent anomaly occurs northwest of Wanapitei Lake (Fraleck Township) where strong U, Be, Ce, Mo, Nb, Th, REEs, ±W anomalies are coincident with a granitic intrusion. This area is further described as anomalous area 1 below. Northwest of Levack, a similar suite of anomalous elements occurs associated with another granitic intrusion.

A discrete area of anomalous Ce-P-Sr-S±Cr±Zn occurs in the southeast corner of the survey area underlain by Grenville Province rocks; this may signify a unique lithology in this area.

Most of the anomalous Ca levels in lake sediment are associated with either Huronian limestone or dolostone or thick sequences of glaciofluvial deposits. The former occurs in Parkin and Fraleck townships and an example of the latter is in Maclennan Township south of Wanapitei Lake.

Highly anomalous levels of sodium (Na) were determined in lake sediments from a number of urban Sudbury lakes, including Minnow Lake (1100 ppm), Bethel Lake, Richard Lake (766 ppm), Johnny Lake, Silver Lake, Hannah Lake, Robinson Lake and Kelly Lake (841 ppm). The origin of this Na is presumed to be anthropogenic, primarily from salt spread on roads. Although historical sampling of water from these urban lakes (Pearson et al. 2002a) shows high levels of Na (up to 139 ppm), the levels found by this survey in deep sediment is surprising. It is possible that storm water (sewer) discharge has resulted in a much higher sedimentation rates for these inner city lakes and therefore "pristine" sediment was not reached at a >20 cm depth. Still, for Na, a fairly conservative element (tends to stay in solution), to persist to >20 cm depth suggests a mechanism of downward dispersion is operating in these lakes (S.M. Hamilton, OGS, personal communication, 2004). The source is likely to be either salt contaminated storm runoff or salt contaminated groundwater input (seeps) to the lakes. The highest levels of Na in lake sediment were obtained in the Levack area, spatially associated with roads and mining activity. This could be the result of acid water mitigation by the addition of sodium hydroxide. High levels of Na are also associated with Highway 144 southwest of Whitewater Lake.

Arsenic levels at 12 lake sites in the Sudbury survey area exceed the Provincial Sediment Quality Guideline (PSQG) severe effect level of 33 ppm. Eight of these sites are located in Falconbridge and Maclennan townships. These anomalies are discussed in more detail later in this report.

Most of the regional distribution of Cu-Ni±Pd±Pt is spatially associated with SIC rocks. Anomalies due to contamination are localized to lakes in close proximity to tailings or slag or waste rock, or lakes in which the sediment record has not been preserved (usually very shallow lakes and ponds created by beaver dams). A pattern of high Cu-Ni±Pd±Pt occurs in some urban Sudbury lakes (e.g., Ramsey, Minnow and Kelly lakes). This pattern extends to the area south of Long Lake, underlain by the Chief Lake batholith. Most of the anomalous lakes south of Long Lake are associated with the contact area between the Chief Lake batholith and Nipissing gabbro–Hough Lake Group sediments. However, elevated to anomalous Ni±Cu persists over much of the Chief Lake batholith; these levels may, in part, be related to the consistently acidic water pH over this batholith, resulting in increased Cu-Ni mobility (and accumulation) in the surficial environment. The Chief Lake batholith also features a distinctive U±Mo signature, similar to the felsic intrusives in the extreme northern parts of the survey area.

A total of 58 lake sediment samples exceeded the severe effect level of the PSQG for Cu, which is set at 110 ppm. A total of 134 lake sediment samples exceeded the severe effect level of the PSQG for Ni, which is set at 75 ppm.

Silver levels in lake sediment along most of the South Range are significantly anomalous. This correlates well with the fact that the South Range Cu-Ni deposits and occurrences have higher silver content than North and East range deposits (F. Brunton, personal communication, 2003).

Description of Selected Anomalous Areas

Appendix A contains proportional dot maps for the following parameters: water pH; water electrical conductivity; sediment loss-on-ignition (LOI); and lake depth. Appendix B contains lake sediment dot maps for the following: Ag, As, Cd, Cs, Co, Cr, Cu, Fe, Ga, Hg, Li, Mn, Mo, Nb, Ni, Pb, Pd, Pt, total PGEs, total REEs, Sb, Ta, U, V, W and Zn. A total of 1298 ICP sample analyses were used to generate the dot plots. A total of 1096 FA–ICP–MS analyses were used to generate the Au, Pt, Pd and PGEs dot maps. The data for the PGE proportional dot map was derived by adding together the levels of Pd, Pt, Ir and Rh. Most of the Ir and Rh data were below detection limit and represent minimum values (not total); these data have been included in MRD 131. Appendix C contains the analytical data for most of the elements of interest, and includes UTM co-ordinates in North American Datum 1983 (NAD83), Zone 17.

The following section is a summary of most of the multi-element and/or multi-site precious and base metal anomalous areas within the Sudbury survey area. They have not been ranked. All of the most significant precious metal (Pt, Pd) anomalies, in terms of multi-site and multi-element character, are listed below. Each anomalous area is keyed to Figures 6 and 7, which show the approximate areal extent of the anomalous areas. A bedrock geology base was used for Figure 6, while the land tenure situation as of January 2004 is depicted on Figure 7. Note that some base metal anomalies and some single site precious metal anomalies do exist that are not listed or discussed below.

Where the "±" symbol is used in the area description, this means the particular element is present at elevated to anomalous levels in some, but not all, of the sample sites in the area in question. The term "elevated " means above the 90th percentile, while "anomalous" means greater than the 95th percentile. Strongly or highly anomalous means greater than the 98th percentile. A total of 18 lake sediment samples with loss-on-ignition values of <10% were excluded from the data set that was used to generate the statistics and proportional dot plots for this report. The data for these samples are included in MRD 131.

Due to the potentially strong geochemical signal (i.e., for elements such as Cu) in the vicinity of SIC rocks, statistics for lake sample sites underlain by Huronian Cobalt Group (n = 495) and Grenville Province (n = 106) rocks were calculated separately for use in the interpretations below. Therefore, the descriptions of anomalous areas underlain by these rock types may indicate more (or less) lakes are anomalous than is apparent from the proportional dot plots in Appendix B.

1. Fire Lake area (Grigg and Fraleck townships)

Ce, La, Be, Mo, REEs, U, ±Pb, ±V, ±Fe, ±Nb, ±Th, ±W

Sites: 415-434, 439, 440, 454-460, 462,463

This multi-site, multi-element anomalous area is dominantly underlain by a granitic intrusive. The geochemical results are likely a reflection of the unique chemistry of this pluton in contrast to the Cobalt Group sediments which lie to the south and east. Mineral Deposit Inventory (OGS 2002) occurrences for Mo, Cu and Th exist in the area, so there is potential for polymetallic mineralization. As of January 2004, most of this anomalous area was available for staking.

2. Alma Lake area (Clary, Demorest and Sheppard townships) Cu, Mo, Sb, ±Zn, ±Mn

Sites: 524-526, 529, 530

This anomalous area is underlain by Huronian Supergroup (Cobalt Group) sediments. Several lakes returned anomalous levels of Cu-Mo-Sb. The highest Cu value came from a very deep lake (17 m) with relatively inorganic sediment (23% LOI); anoxic bottom conditions and the inorganic content may be responsible for this apparent Cu enrichment, not necessarily a bedrock point source. Anomalous Sb is present in quite a few lakes to the south of this area, extending down to anomalous area #4. Several Mineral Deposit Inventory (MDI) Cu-Ag occurrences have been documented to the southwest. As of January 2004, this area was available for staking although it is within an enhanced management area.

3. Tower Lake area (Parkin and Aylmer townships) Cu, ±As, ±Co, ±V

Sites: 281, 282, 285, 286, 309, 310, 311, 319

This area is underlain primarily by Huronian (Cobalt Group) sediments; older Huronian sediments (possibly calcareous Quirke Lake Group, are inferred from pH increase in the overlying lakes) occur in the northeast portion of this area (OGS 1991). A prominent northwest-trending linement (fault) cuts across this area; the Wanapitei River follows the trace of this fault. Several lake sites returned elevated to anomalous Cu, in particular, site 285 with 107 ppm. The lake site downstream of site 285 returned elevated Cu and As. These anomalies and the presence of several MDI Cu occurrences in the area, indicate further investigation is warranted. As of January 2004, approximately half of this anomalous area was open for staking.

4. Rawson Lake area (McConnell Township) ±Cu, ±Mo, REEs, Ce, La, ±Pd, ±Sb, ±Zr

Sites: 503, 610, 612, 615

Cobalt Group sediments underlie this area and no significant glacial drift has been mapped (Barnett et al. 1991). The sediment sample from site 612 returned anomalous Cu (135 ppm) REEs, W, Zr and elevated Mo and U. Site 610 has a similar anomalous element assemblage except for the Cu. As of January 2004, this area is available for staking, although it is within an MNR enhanced management area.

5. Big Valley Lake area (MacCarthy Township) Mo, ±W, ±Pd, ±Sb, ±Cu

Sites: 840, 841, 865

The bedrock geology of this area is Cobalt Group, sediments (OGS 1991). The eastern half of the area is covered by till (Barnett et al. 1991). Anomalous Pd at site 865 should be treated with caution as no corresponding elevated or anomalous levels of base metals were determined. Sites 840 and 841 appear to be valid anomalous sites featuring elevated to anomalous chemistry, but more reflective of a granitic source than of Huronian sediments. As of January 2004, this area is available for staking although within an enhanced management area.

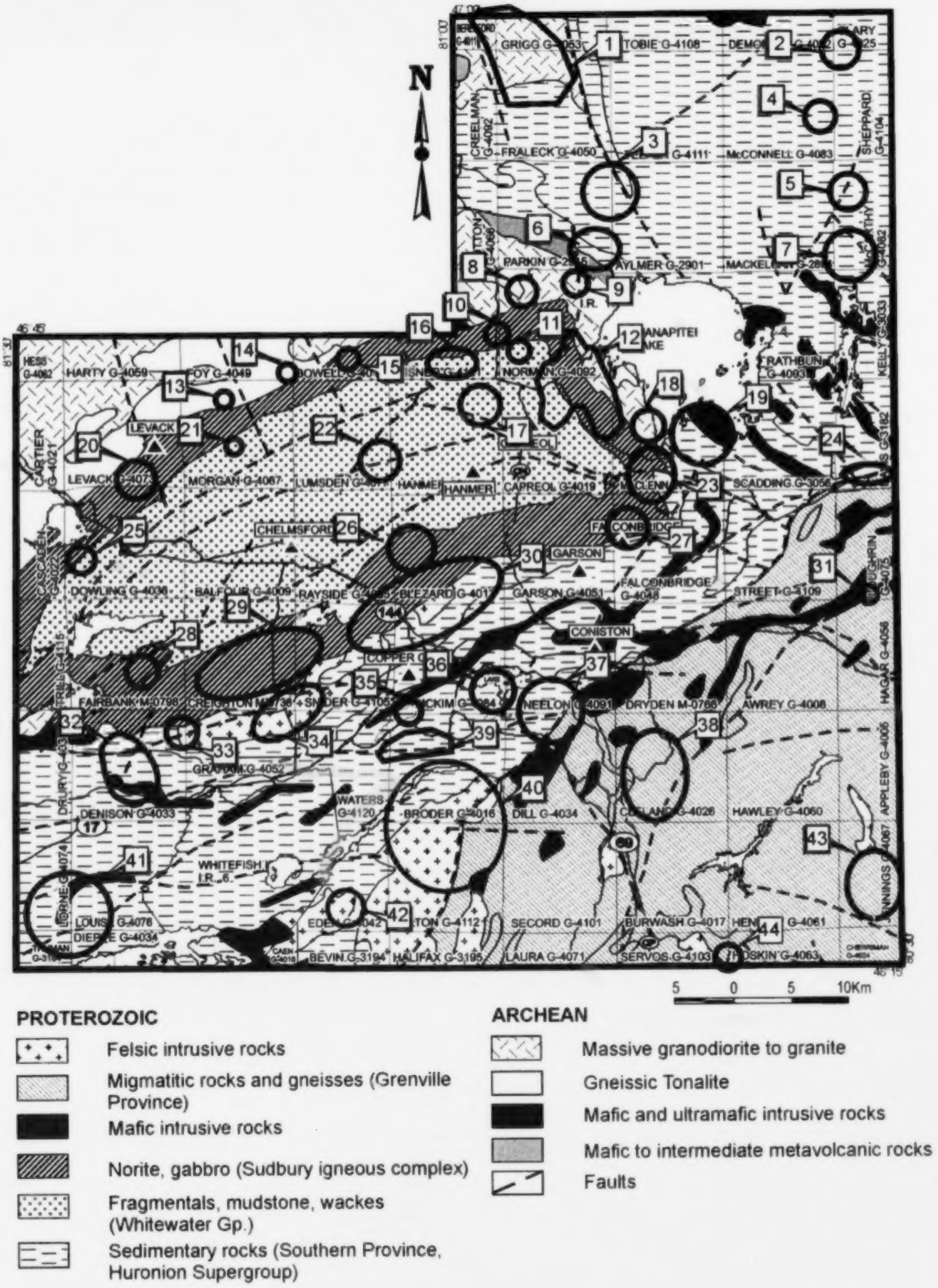
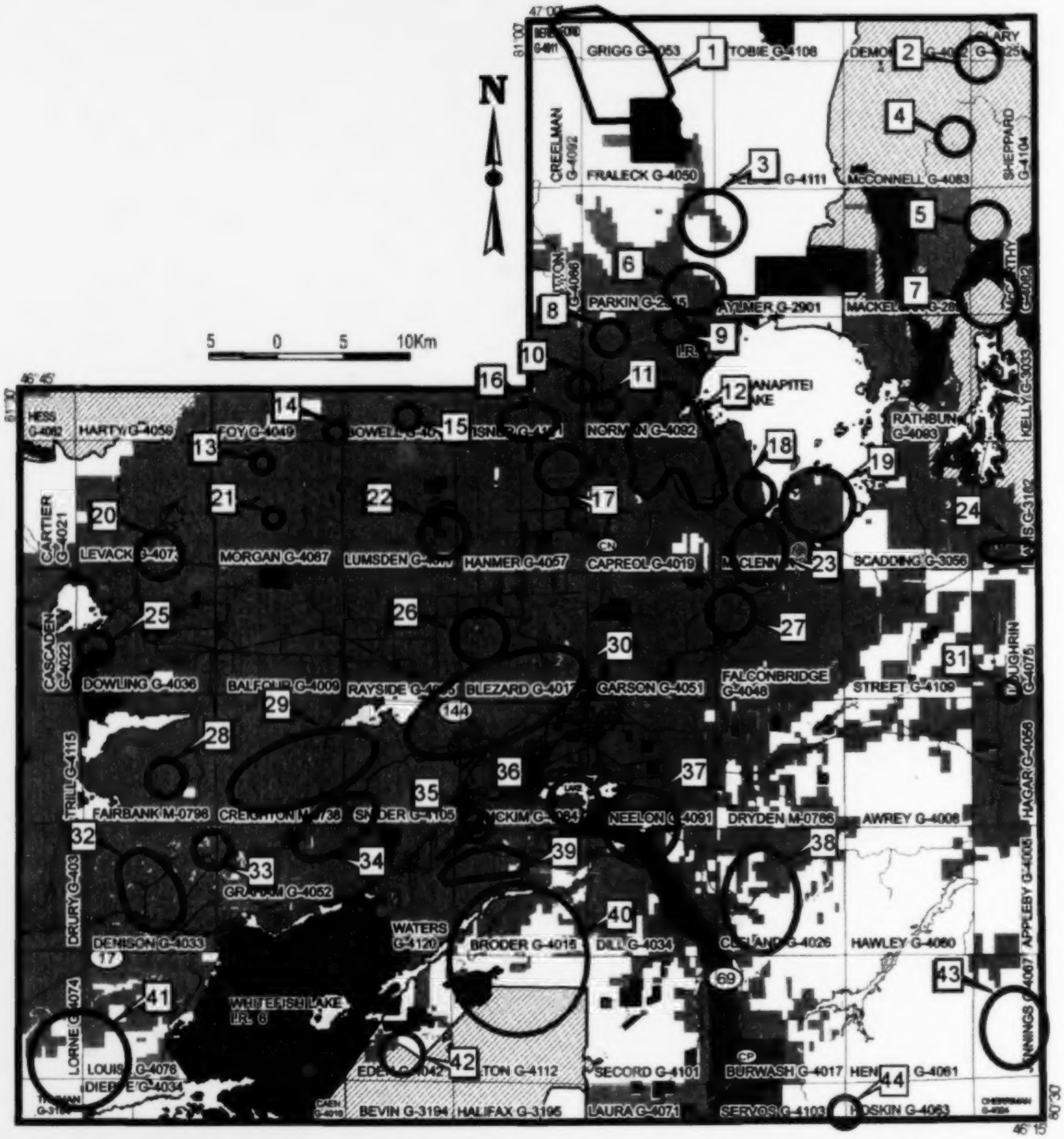

N
GRIGG G-4053
TOBIE G-4108
FRALECK G-4050
McCONNELL G-4083
SHEPPARD G-4104
CREELMAN G-4092
PARKIN G-2915
AYLMER G-2901
MACKELCAN G-2892
WANAPITEI LAKE
RATHBUN G-4093
HESS G-4062
HARTY G-4059
FOY G-4049
BOWELL
NORMAN G-4092
LEVACK
CARTIER G-4021
MORGAN G-4087
LUMSDEN
HANMER
CAPREOL G-4019
SCADDING G-3056
CHELMSFORD
GARSON
FALCONBRIDGE
FALCONBRIDGE G-4048
CASCADEN G-4022
DOWLING G-4036
BALFOUR G-4009
RAYSIDE
BLEZARD G-4011
GARSON G-4051
STREET G-4109
CONISTON
COPPER CLIFF
FAIRBANK M-0798
CREIGHTON M-0736
SNIDER G-4105
McKIM
NEELON G-4091
DRYDEN M-0766
AWREY G-4006
HAGAR G-4056
DRURY G-403
GRAHAM G-4052
WATERS G-4120
BRODER G-4016
DILL G-4034
CLELAND G-4026
HAWLEY G-4060
APPLEBY G-4005
DENISON G-4033
WHITEFISH I.R. 6
LORNE G-4074
LOUISE G-4076
DIEPPE G-4034
EDEN G-4042
SECORD G-4101
BURWASH G-4017
HENRY G-4061
BEVIN G-3194
HALIFAX G-3195
LAURA G-4071
SERVOS G-4103
HOSKIN G-4063
JENNINGS G-4067
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
17
69
144
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

Figure 6. Location of geochemically anomalous areas.


N
5 0 5 10Km
47°00'
81°00'
46°45'
81°30'
46°15'
80°30'
GRIGG G-4053
TOBIE G-4108
FRALECK G-4050
McCONNELL G-4083
CREELMAN G-4092
SHEPPARD G-4104
PARKIN G-2915
AYLMER G-2901
HESS G-4062
HARTY G-4058
FOY G-4049
NORMAN G-4092
RATHBUN G-4093
KELLY G-3033
CARTIER G-4021
LEVACK
MORGAN G-4087
LUMSDEN
HANMER G-4057
CAPREOL G-4019
MACLENNAN
SCADDING G-3056
CASCADEN G-4022
DOWLING G-4036
BALFOUR G-4009
RAYSIDE
BLEZARD G-4012
GARSON G-4051
FALCONBRIDGE G-4048
STREET G-4109
HAGAR G-4056
TRILL G-4115
FAIRBANK M-0798
CREIGHTON
SNIDER G-4105
MCKIM
NEELON
DRYDEN M-0786
AWREY G-4008
DRURY G-403
GRAHAM G-4052
APPLEBY G-4005
DENISON G-4033
WATERS G-4120
BRODER G-4015
DILL G-4034
HAWLEY G-4060
WHITEFISH LAKE I.R. 6
LORNE G-4074
LOUISE G-4076
DIEPPE G-4034
EDEN
SECORD G-4101
BURWASH G-4017
BEVIN G-3194
HALIFAX G-3195
LAURA G-4071
SERVOS G-4103
HOSKIN G-4063
JENNINGS
WANAPITEI LAKE
I.R.
CN
CP
17
69
144
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44

▨ Staked land, under lease or patent as of January 2004.

■ Proposed protected areas (Living Legacy; withdrawn from staking)

■ Parks and protected areas

▨ Enhanced management areas (Living Legacy; not withdrawn from staking)

Note: This figure is intended to represent the approximate state of land tenure as of January 2004. It is not a legal description and cannot be used as a substitute for the files of the regional Mining Recorder.

Figure 7. Land tenure showing geochemically anomalous areas described in text.

6. Milnet Mine area (Parkin Township) Cu, S, Ca, ±As, ±Ag, ±Hg, ±Pd, ±Zr, ±Sb, ±V

Sites: 256, 257, 259, 261, 263, 266

The underlying bedrock geology of this area is dominantly Proterozoic sediments of the Cobalt and Quirke Lake groups. Calcareous rocks (possibly marble and/or dolostone units) of the Quirke Lake Group are interpreted to be present due to relatively high lake water pH. Anomalous levels of Ca in sediment in most of the lakes, neutral to slightly alkaline lake water pH levels and higher than average conductivity all indicate high major element loadings to the lakes, as compared to the lakes to the northeast and southwest. The Parkin Offset lies close to the western edge of this area.

Sites 257, 256 and 261 are noteworthy as they have the most interesting assemblage of anomalous elements (Cu-Zn-As) and occur along the same drainage. The contractor sampled the same lake twice (sites 256 and 261) and this inadvertent field duplicate returned very similar chemistry. A number of Au, As, Cu and Cu-Ni occurrences are present in this area and the past Cu-Ni producing Milnet Mine lies at the west edge of the area. As of January 2004, this area was unavailable for staking as it is located within privately held land, or has been previously staked.

7. Kettyle Lake area (McCarthy Township) Cu, Sb, ±Mo, ±REEs, ±Sc, ±W, ±Zn

Sites: 820, 823-825, 829, 831

This anomalous area consists of a cluster of lakes that returned elevated to anomalous Cu-Sb ±Mo±Zn levels. The bedrock geology consists of Huronian sedimentary rocks (Cobalt Group). Surficial materials are thin and discontinuous except for the northeast portion of the area where continuous till is present (Barnett et al. 1991). Most of this area is available for staking although it is designated as an OLL enhanced management area.

8. Grassy Lake area (NW Norman Township) Pd, Cu, Cr, Zr, ±U, ±W, ±Mn

Site: 471

This anomaly is located on granitic terrain north of the SIC. This elongate, thin and shallow lake is part of a creek drainage, which is consistent with the high water electrical conductivity obtained at this site. The low LOI (11.8%) and description in the field notes indicate this was a silt-clay sediment which likely explains the suite of anomalous trace elements. Therefore, this anomaly probably does not relate to a bedrock point source. An MDI occurrence of Au-Ag-Pb lies approximately 500 m to the west of site 471. As of January 2004, this area was unavailable for staking, as it is located within privately held land, or has been previously staked.

9. Post Lake area (NE Norman Township) ±Cu, ±U, ±Mo, ±Cd, ±REEs

Sites: 253, 254

The bedrock geology of this area consists of Archean metavolcanic and granitic rocks (Rousell 1998). The geochemical signal at site 254 is primarily a Cu anomaly. The anomaly may be related to the MDI Zn-Cu occurrence located approximately 500 m to the west. As of January 2004, this area was unavailable for staking as it is located within privately held land, or has been previously staked.

10. Bronson Lake (Wisner Township)

As, Cd, Co, Cr, Fe, Hg, Mn, Ni, Pb, Sb, Sn, Zn, ±Pd, ±Pt, ±Cu, ±W, ±S

Site: 601

The sample from Bronson Lake returned a broad suite of anomalous elements. The bedrock geology has been mapped as granophyre of the Sudbury Igneous Complex (Rousell 1998). This lake is actually part of the Vermilion River, therefore, the sediment obtained here would be atypical for this survey. The anomalous results likely reflect anthropogenic contamination from upstream mining activities of the placer gold rush of the late 1800s (Coleman 1901). As of January 2004, this area was unavailable for staking as it is located within privately held land.

11. Rockcut Lake (SW Norman Township) Hg, Pb, W, ±As, ±Pd, ±Pt, ±Cd, ±Cu, ±Mo, ±Ni, ±S

Sites: 1107, 1108

This area straddles the contact area between SIC granophyre and Onaping Formation (fragmentals, mudstone, wackes). The trace element signature at site 1107 (Mo-Zr-W-REEs) may be natural, but, at site 1108, the assemblage of anomalous elements, including Pb and Hg, suggests contamination. However, quite a few diamond drill holes have been completed on the west side of this lake, so there may be a bedrock source to explain this lake sediment geochemistry. As of January 2004, this area was unavailable for staking as it is located on privately held ground.

12. Ella Lake area (Norman and Capreol townships)

±Pd, ±Pt, Cu, Ni, ±As, ±Cr, ±Ta, ±Ag, ±Mo, ±W, ±Th, ±Sc, ±Sn, ±Co, ±V

Sites: 25, 26, 38, 37, 39, 40, 45, 231, 234, 236, 239, 240, 244, 245, 1102

This area covers a significant portion of the east range with most lakes part of the Wanapitei Lake drainage watershed. The extreme southwest portion of the area is part of the Spanish River watershed. Bedrock-dominated terrain with deeper than average lakes and containing relatively inorganic lake sediments occur throughout the central and eastern half of this area. The southwestern portion of the area features lower relief, much more organic terrain and consequently lakes with sediment of a higher organic content. The bedrock geology consists of, from east to west across the area, Archean granites, SIC rocks and Onaping Formation volcanic rocks. Within this broad anomalous area lies the Capre Lake and Victor Ni-Cu-PGE deposits, as well as several other MDI Cu occurrences. As of January 2004, this area was unavailable for staking as it is located within privately held land, or has been previously staked.

13. Rudy's Lake (Morgan Township) Pt, Br

Site: 129

This anomalous area consists of a single lake (site 129) with anomalous Pt and Br. No other elements are anomalous, either in this survey or the previous sampling conducted by the NGR program, although they did not analyze for Pt or Pd. The bedrock geology has been mapped as Archean felsic intrusive rocks (Rousell et al. 2002). The surficial geology consists of glaciofluvial sand or gravel of the Cartier Moraine (Bajc 1997). Although the sediment from Rudy's Lake is dominantly organic (62% LOI), it is suggested that this Pt result is either spurious or due to clastic inorganic sand and/or silt from the Cartier Moraine and not reflecting a local source. As of January 2004, this area was unavailable for staking as it is located within privately held land, or has been previously staked.

14. Southeastern Foy Township Pd, As, Cu, Hg, Ni, Pb, S, Sb, Sn, V, ±Ag, ±Cd, ±Zn, ±Fe

Site: 109

This is a single lake site multi-element anomaly. The lake occurs along a linement and therefore is likely structurally controlled. The bedrock geology has been mapped as Archean felsic intrusive, although it is very likely that a portion of this lake is underlain by diabase which has been mapped along strike to the southeast (Rousell 1998). As of January 2004, this area was unavailable for staking as it is located within privately held land, or has been previously staked.

15. Nelson Lake area (Bowell Township) Pt, Pb, S, Sb, ±Cd

Site: 65

This is a single lake site anomalous area. The underlying bedrock geology consists of Sudbury Igneous Complex rocks. A number of Cu-Ni-PGE occurrences are located to the northwest associated with the Foy offset. As of January 2004, this area was unavailable for staking as it is located within privately held land.

16. Joe Lake area (Wisner Township) Cu, ±Ni, ±Hg, ±Ag, ±Pb, ±Sb

Sites: 56, 122, 604, 605

This area straddles the contact between SIC and Onaping Formation rocks. Surficial geology consists of a mix of thin till, organic terrain and glaciofluvial ice-contact deposits (Barnett and Bajc 2002). As of January 2004, this area was unavailable for staking as it is located within privately held land.

17. Onwatin Lake area (Hanmer Township) S, ±Pt, ±Pd, ±Cu, ±As, ±Ni, ±Cr, ±Mo, ±Zn

Sites: 726, 727, 728, 729

Thick drift characterizes this area including modern alluvium associated with the Vermilion River system. Below the drift cover, the bedrock geology consists of Onwatin Formation rocks. The anomalous geochemistry in this area may reflect anthropogenic contamination of the Vermilion River during the placer gold rush of the late 1800s (Coleman 1901). As of January 2004, this area was unavailable for staking as it is located within privately held land.

18. Massey Bay area (Maclennan Township) Ca, Cu, Hg, Ni, ±Pb, S

Sites: 5

This is a single lake site anomaly underlain by granitic and Nipissing gabbro rocks. The past producing Nickel Rim Mine lies approximately 2 km to the west and the MDI database shows a U occurrence to the east near the shore of Wanapitei Lake. This anomalous lake is very shallow (1 m) and contains relatively high organic sediment (LOI of 82%). It is most likely that the anomalous geochemistry of this sediment is related to a combination of the high organic content (favouring organo-metallic complexes), the very shallow lake depth (potential for disturbed, mixed sediment) and the presence of gabbroic rocks nearby. Therefore, this lake sediment anomaly is considered to have very little potential to relate to point-source bedrock mineralization. As of January 2004, this area was unavailable for staking as it is located within privately held land, or has been previously staked.

19. Kolari Bay–Bonanza Lake area (Maclennan Township)

±As, ±Hg, ±Pd, ±Pt, Cu, ±Ni, ±Pb, ±Zr, ±Zn, ±Sn, ±Sb, ±S

Sites: 190, 191, 196, 199, 226, 227, 229

This fairly broad anomalous area consists a number of lakes with anomalous Cu-Ni-Pb±Pd. The bedrock geology consists of a mix of Huronian sediments and Nipissing diabase or gabbro (Rousell et al. 2002). Site 226 in this area has the distinction of having the highest arsenic level of the survey at 229 ppm, which is almost 7 times higher than the severe effect level of the Provincial Sediment Quality Guidelines (PSQG). This area was also identified by Bajc and Hall (2000) as being geochemically anomalous with a similar suite of metals determined in "B" and "C" horizon soil samples. The MDI database indicates the presence of several Au and Au-Cu deposits in this area. This area warrants further investigation however, most of this area was unavailable for staking as of January 2004.

20. Mosquito Lake–Diabase Lake area (Levack Township) Ni, ±Cu, ±Cd, ±Na, ±Pb, ±Sb, ±S

Sites: 1224, 1225, 1227, 1228

The bedrock geology of this area as consists of norite and gabbro (Sudbury Igneous Complex) rocks. Two of the anomalous lakes are underlain by quartz norite and are close to the Levack East, Craig and Onaping Cu-Ni deposits. Water conductivities in 7 lakes within this area exceed 250 µS/cm. Diabase Lake and Mosquito Lake also returned the 2 highest Na concentrations of the entire survey. The geochemical signature in this area relates well to the known deposits and occurrences in the area, but the Pb and Na levels indicate an anthropogenic component has been superimposed. As of January 2004, this area was unavailable for staking as it is located within privately held land.

21. Carriere Lake area (Morgan Township) As, Pb, Pd, Pt, Cu, Ni, S, Sb, Cd, Mo, ±Zn

Sites: 172, 173, 183

Site 173 is the most anomalous of the 3 lake sites identified in this area. The bedrock geology is mapped as Onaping Formation fragmentals of the Whitewater Group. Bajc and Hall (2000) identified this same general area to be anomalous in Pb within till by selective leach analysis. An MDI occurrence to south of this area is called the Carriere deposit (S-Cu-Pb-Zn). This area was unavailable for staking as of January 2004 as it is located within privately held land.

22. Lumsden Township area Al, Ca, Cr, Hg, Nb, Sc, Zr

Sites: 180, 181

This anomalous area consists of 2 shallow lakes underlain by a mix of bedrock, organic terrain and glaciolacustrine clay. The bedrock is mapped as Chelmsford Formation sedimentary rocks (Rousell et al. 2002). The lake sediment geochemical response at these lakes is likely due to the relatively inorganic nature of the sediments and the contribution from glaciolacustrine clay. As of January 2004, this area was unavailable for staking as it is located within privately held land, or has been previously staked.

23. Pot Hole Lake area (Maclennan Township)

As, Pd, ±Pt, ±Cu, ±Ni, ±Pb, ±Cr, ±U, ±W, ±Sb, ±Na, ±S

Sites: 873, 979, 1360, 1361

This anomalous area consists of a series of deep pothole lakes within thick glaciofluvial deposits near the Sudbury airport. Below the drift cover lies granophyre and norite of the SIC and Huronian sediments. Site 979 returned one of the highest arsenic values of the survey at 138 ppm. These lakes are situated within an active groundwater system therefore are probably groundwater fed to some degree; neutral pH

(7.0) and high water electrical conductivities (mean = 267 μS/cm) are consistent with this theory. The anomalous levels of Na in deep sediment could be related to road salt, transported via groundwater. This transport mechanism may also explain the anomalous levels of arsenic in deep sediment. Besides the prospect of anthropogenic contamination, there are possible natural origins of As, including bedrock and the drift cover. PGE bearing arsenides and sulphurarsenides are common on the South Range of the SIC (Cabri and Laflamme 1976). The present survey outlined As anomalies in lake sediment to the northeast and Bajc and Hall (2000) identified several As anomalous areas in soil to the north and east. This area was unavailable for staking as of January 2004 as it is located within privately held land.

24. Kabikotitwia River area (Davis Township) As, Pb, Cd, Co, Ni, ±Pd, ±Pt, ±Cu, ±Sn

Sites: 210, 214, 215

This anomalous area straddles a portion of the Grenville Front in southern Davis Township. Site 210, a shallow small pond, returned anomalies in a number of elements, including Pt, Pd, Cu and Ni. Two other sample (sites 214 and 215) are actually along the Kabikotitwia River and as such, must be treated with caution due to possible enhanced sedimentation rate and sediment disturbance. The bedrock geology underlying site 210 consists dominantly of Southern Province sediments, however, the geochemical signature suggests a mafic source such as Nipissing gabbro. Several Au and Au-Cu-Ag MDI occurrences are located in the general area as well. Quite a few diamond-drill holes, all focussed on Southern Province sediments, have been completed in the area. As of January 2004, this area was almost entirely unavailable for staking as it is located within privately held land, or has been previously staked.

25. Poika Lake (Dowling Township) Be, Cu, Hg, Pb, Zn, Sb, Sn, ±Ag, ±As, ±Cd, ±Co, ±S

Site: 1218

This area is bisected by the contact between SIC granophyre and Onaping Formation breccias. The terrain is bedrock dominated with minor mappable till (Barnett and Bajc 2002). An MDI occurrence of Cu-Pb-Zn lies to the south of this anomalous area. The lake sediment geochemical signature here may be related to Cu-Pb-Zn sulphides which are common to the Onaping Formation breccias, locally reaching a content of 5% (Muir and Peredery 1984). This area was unavailable for staking as of January 2004 as it is located within privately held land.

26. West-central Blezard Township area Ag, ±Cd, ±Cu, ±Hg, ±Mo, ±Ni, ±Pb, ±Zn

Sites: 1266-1268, 1270-1273

This area consists of number of lakes with anomalous Ag and elevated levels of Cd, Cu, Pb, and Zn. The area straddles the contact between Onaping Formation breccia and SIC granophyre. Along this contact to the west of the area is a Cu-Pb-Zn MDI occurrence. The terrain is bedrock dominated with organic peat deposits in low lying areas and surrounding the lakes. This geochemistry may relate to Cu-Pb-Zn mineralization associated with the contact area between the SIC rocks and Onaping Formation, or may be a signature due to glacial smearing from mineralized Onaping Formation rock up ice to the northeast. This area was unavailable for staking as of January 2004 as it is located within privately held land.

27. Falconbridge tailings area (Falconbridge Township) As, Cd, Cu, Ni, Pb, Zn, ±S, ±Co, ±Zr

Sites: 1363, 1423

Two lakes in the vicinity of mining and smelting activities at Falconbridge returned highly anomalous levels of many metals. The 2 lakes are within 1 km of several tailings dumps used by the Falconbridge smelter site. Site 1363 returned one of the highest As levels of the survey at 141 ppm. Mining activities have clearly influenced the sediment geochemistry of these lakes.

28. Gordon Lake area (Fairbank Township) ±Ag, ±Cr, ±Hg, ±REEs, ±Zn, ±Zr

Sites: 1297, 1298, 1310-1312

In this area, 1 site on Gordon Lake returned anomalous levels of Cr, Zn, Zr and Li. The relatively inorganic nature of the sediment in this lake is the likely cause of these apparent anomalies. To the south of Gordon Lake, 3 very shallow lakes with high to extremely high organic content (80.6% LOI) returned elevated to anomalous levels of Hg, Ag and REEs. The high organic content at site 1310 and 1312 may explain their anomalous Hg results; it is well documented that Hg has an affinity for organic material (e.g., Rasmusson 1993). The combination of Ag-REEs with no Cu-Pb-Zn is unusual, however, a Pb-Ag-Cu MDI occurrence is present in the general area. Bedrock geology consists of mostly SIC granophyre and minor Onaping Formation fragmental rocks.

29. McFadden Falls–Levey Creek area (Creighton Township)

Ag, Cr, Cs, ±Ni, ±Hg, ±Cu, ±Li, ±Pb, ±Pd, ±Zr, ±Al, ±Sb, ±Th, ±As, ±Na

Sites: 1252-1255, 1257-1259, 1290, 1293, 1294, 1315, 1316, 1318

This anomalous area consists of a number of shallow lakes with relatively inorganic lake sediment. Bedrock geology consists of SIC rocks, granophyre, quartz norite and norite. Surficial geology is a mix of bedrock, organic deposits (peat, muck) and glaciolacustrine clay and/or silt. The assemblage of anomalous elements are dominantly lithophile which are relatively immobile in the surficial environment, except by mechanical transport. Several of the anomalous sites occur in ponded water along natural drainage waterways, therefore only exist due to beaver dams. Field notes for many of the samples indicated the presence of silt and sand. The shallow lake depth (1 m) of many of the lakes in this area raise the possibility of disturbed sediment. Although some elements of a mafic geochemical signature (Cu-Ni) exists in this area, which is expected as a result of the underlying SIC rocks, superimposed on this is a geochemical signature that reflects the presence of transported, and possibly exotic, inorganic clay or silt material and/or in cases of disturbed sediment profile, anthropogenic contamination. This area was unavailable for staking as of January 2004 as it is located within privately held land.

30. Pump Lake to Whitson Lake area (Snider, McKim, Blezard townships)

Ni, Cu, ±Pd, ±Pt, ±Ag, ±Cr, ±Hg

Sites: 20, 1262, 1277-1279, 1281-1284

This series of anomalous lakes is underlain by norite of the SIC, stretching from Pump Lake in the southwest to the south end of Whitson Lake in the northeast. A number of Ni-Cu deposits and occurrences are located along the southern edge of this area, including the Murray, McKim, Frood–Stobie and Blezard mines. The most Ni-Cu anomalous lake sediment sample came from south of Whitson Lake (site 20) which is in close proximity to the old Blezard Mine workings and roast yard. Anomalous elements at this location also included Pb, Sb, Co, S, Ag and Cd. At the extreme west end of this area, the sample from Pump Lake was the next most anomalous. Considering the presence of tailings and fill within and around Pump Lake, the lake sediment geochemistry is quite muted with only 173 ppm Cu and 291 ppm Ni. The remaining Ni-Cu±Ag anomalous lakes and ponds in the area most likely reflect the natural geochemical signature of the underlying, locally sulphide-bearing norite. This area was unavailable for staking as of January 2004 as it is located within privately held land.

31. Southern Loughrin Township area Al, Ba, Cr, Cs, K, Li, ±Pb, ±Sn

Site: 1514

This is a single site sediment anomaly underlain by gabbro-anorthosite (OGS 1991). The field notes indicate that this sample site was on ponded water behind a beaver dam. There is a good chance of disturbed sediment and/or the sampled substrate may be mineral soil. The relatively low LOI and assemblage of anomalous lithophile elements are evidence of the contribution of an inorganic phase to the sample obtained. The geochemical signature may relate to the underlying geology, but not likely to a point source of mineralization. This area was unavailable for staking as of January 2004 as it is located within privately held land.

32. Victoria Mine area (Denison Township) ±Pd, ±Pt, ±Cu, ±Ni, ±Co, ±Li, ±Ca

Sites: 1168, 1170, 1171, 1173, 1176

This anomalous area encompasses the past producing Ni-Cu-PGE Victoria Mine area and roast yards. This bedrock geology consists of SIC Sublayer, Footwall Breccia and the Vermilion Offset dike. Site 1176 is located north of the Victoria deposit, underlain by norite and Contact Sublayer rocks. It returned elevated Pd, Pt, Sb and S. The sample site to the south (site 1175) failed to yield a suitable sediment sample. As of January 2004, no ground was available for staking in this area.

33. Crean Hill #3 Mine area (Denison and Graham townships) Cu, Ni, Pd, ±Pt, ±Sb, ±Cd, ±Mo, ±Ag

Sites: 1354, 1355

Two lake sites comprise this anomalous area, which covers the past producing Cu-Ni Crean Hill #3 mine area. The Lockerby and Graham–McVittie Cu-Ni deposits are located in this area as well. Site 1354 is underlain by the Creighton felsic intrusion and site 1355 is underlain by SIC norite. Consequently, the geochemical signatures at these 2 lakes are quite different. Site 1355 returned a mafic signature (Cu-Ni-PGEs) contrasting with a "granitic" signature (Ag-Mo-K-Na) at site 1354. The mining activity and mine fill or waste rock have had little effect on the deep sediment of the sampled lakes. Land within this anomalous area is privately held and therefore unavailable for staking.

34. Creighton Mine area (Graham and Snider townships)
±Cu, ±Ni, ±Pd, ±Pt, ±Mo, ±U, ±W, ±Cd, ±Pb, ±Sb, ±Co, ±S, ±Na

Sites: 1341, 1344 to 1346, 1348 to 1350

This anomalous area consists of numerous lakes with either a mafic signature (Cu-Ni-Co-PGEs) or a granitic signature (Mo-W-U). The bedrock geology consists of Creighton Granite, Elliot Lake Group sediments and volcanic rocks and SIC norite. The Creighton, Gertrude and NorthStar Cu-Ni deposits lie along the northern edge of the outlined area. The old Gertrude roast yard is located approximately 1 km north of site 1344. The most anomalous sediment sample came from site 1341, which lies immediately adjacent to the Copper Cliff tailings area. The broad suite of anomalous elements at this site, including Hg and Pb, indicates pre-industrial sediment was likely not attained here. Sites 1346 has a Cu-Ni signature that reflects the underlying geology of norite and/or offset dike rocks. The pond at site 1350 is very shallow and contains highly organic sediment (LOI = 90%); metal fixation by organics and/or a disturbed sediment profile may be contributing factors to the anomalous levels obtained. Sites 1348 and 1349, underlain by felsic intrusive rocks, have a Mo-W-U signature. As of January 2004, this area was unavailable for staking as it is located within privately held land, or has been previously staked.

35. Kelly Lake As, Hg, Ag, Pd, Pt, Cd, Cu, Cr, Ni, Pb, Zn, La, Rb, W, Th, Sn, Sb, Li, Cs, Co, Ce, Be, Ti, Na, Mg, K, S, Co, Mn, Fe, Ca, ±Mo, ±Al, ±Sr, ±P

Site: 1331

Kelly Lake has a long history of anthropogenic inputs from mining and smelting and sewage effluent (Pearson et al. 2002b). Three sample sites were attempted on Kelly Lake, only the most northeasterly was successful at retrieving a "suitable" sample (LOI = 15%); the other 2 sites retrieved clay-dominated material which was discarded. The suite of anomalous elements obtained from this lake is impressive, as noted by the list shown above. Kelly Lake has been extensively sampled and studied under various programs. The reader is referred to Pearson et al. (1999, 2002b) for additional information and references.

36. Bethel Lake area (McKim Township) Cu, Ni, ±Pd, ±Pt, ±Na, ±Sn

Sites: 1365, 1366, 4255

Three lakes in this area returned anomalous results: Bethel Lake, Ramsey Lake and Bennett Lake. The results from Bethel Lake may not be valid since for years it was used as a sewage lagoon by the nearby Algoma Hospital. The sample from Ramsey Lake was highly inorganic (LOI = 10.6%), therefore, the inorganic phase is likely biasing the metal results. However, anomalous Cu-Ni at site 1366 (Bennett Lake) may relate to mineralization within Nipissing gabbro, which crops out adjacent to the lake. An MDI Cu-Ni occurrence is located approximately 1 km to the south of Bennett Lake, associated with Nipissing gabbro. All of the land in this area is privately held.

37. Daisy Lake area (Neelon and Dill townships)
Cu, Ni, Pd, Pt, ±Zn, ±Cr, ±Co, ±Rb, ±Li, ±W, ±K, ±Sc, ±Al, ±Cs

Sites: 1435, 1437 to 1439

The bedrock geology in this area is mapped as Hough Lake Group sediments, intruded locally by Nipissing gabbro. However, the strong multi-element lake sediment anomalies indicate that proximity to the site of the Coniston Smelter complex has played a strong role in the metals signature of the lakes in this area. Baby Lake is a deep lake (20 m) which returned elevated to anomalous results for all of the elements listed above. The number of anomalous elements in Daisy Lake are fewer, and interestingly, while Ni is anomalous (141 ppm) Cu was not (71 ppm). Downstream from Daisy Lake, Richard Lake returned a smaller suite of anomalous elements including Ni (136 ppm). Cu at 78 ppm, however, is not considered anomalous.

38. Southeast Baby Lake area (Cleland Township) Ni, ±Cu, ±Cr, ±Zn

Sites: 1520 to 1524

This anomalous area consists of 5 widely spaced lake sites, 4 of which returned elevated to anomalous Ni, based on threshold values calculated from the OGS sites located on Grenville Province rocks. A Ni occurrence, identified in the MDI database, is located approximately 1.5 km to the west of site 1522. Based on this anomalous lake sediment geochemistry, the potential exists for other such Ni occurrences in the area. As of January 2004, much of the ground in this anomalous area was available for staking.

39. Crooked Lake–Silver Lake area (Broder Township) Pd, Cu, Ni, ±Cd, ±Pb, ±As

Sites: 1327, 1329, 1334, 1335

This area consists of several Pd-Cu-Ni anomalous lake sites underlain by Nipissing gabbro and Hough Lake Group sediments. As well, it is also quite likely that the Copper Cliff Offset cuts across this area, in the vicinity of sites 1334 and 1335. The Kelly Lake Ni-Cu deposit is located approximately 800 m northeast of site 1334. Silver Lake (site 1327), notable as one of the world most contaminated lakes (Gunn and Keller 1995), returned relatively low levels of metals (anomalous Pd at 6.2 ppb; elevated Cd and Ni at 1.3 ppm and 100 ppm, respectively). As of January 2004, this area was unavailable for staking as it is located within privately held land.

40. Chief Lake area (Broder and Tilton townships)
±Ni, ±Cu, ±Cr, ±Pd, ±Pt, ±U, ±Mo, ±Cd, ±Pb, ±Co, ±W, ±Zn, ±Na

Sites: 1037, 1038, 1091, 1094, 1096, 1098, 1372, 1373, 1376 to 1379, 1383,
1390, 1393 to 1396, 1398, 1430 to 1432, 1450

The anomalous lake sites in this area occur primarily along a zone straddling the contact between Hough Lake Group sediments–Nipissing gabbro and the Chief Lake batholith. A Cu-Ni MDI occurrence is associated with Nipissing gabbro in the north part of this area. Sites 1037 and 1038 are located on Long Lake; their geochemical signature of mainly lithophile elements (Al, Cr, K, Zr, Be, Rb, Ti) is due to the relative inorganic nature of the sediment sampled. At Clearwater Lake (site 1379), the geochemical signature is a combination of mafic (Pd±Ni±Cr) and granitic (W±Mo±U) elements; this corresponds well with the local bedrock geology which consists of Nipissing gabbro and granitic rocks of the Chief Lake batholith. The pond at which site 1094 is located returned a strong multi-element assemblage of elements (Cu, Ni, Pb, Pd, Pt, Sb, S, ±As, ±Cd); however, with a depth of only 1 m, highly organic sediment (81% LOI), and the presence of significant As, Pb and Cd, suggests a mixed or disturbed sediment was obtained. Sites 1096, 1098, 1372 and 1373 returned elevated Ni-Cu-PGE levels that may be a lithological response due to the presence Nipissing gabbro rocks and/or mafic phases of the Chief Lake batholith. The lake sediment from site 1383 returned a strong Cu-Ni-Pd-Pt signature, however, the high levels of As, Cd and Pb suggest that pre-industrial sediment was not obtained.

The Cu-Ni anomaly at site 1390 may not be valid; with a depth of 1 m and containing highly organic sediment (91% LOI), the possibility of disturbed sediment and metal organic fixing is high. The other elevated to anomalous Cu-Ni results that are underlain by rocks of the Chief Lake batholith may be related to pods of Nipissing gabbro or to a disturbed sediment record. Another factor may be the acidic lake water pH over this batholith; this may have resulted in increased Cu-Ni mobility and therefore accumulation, downslope into lakes and lowlying areas.

A number of lake sites also returned a U±Mo signature, similar to the felsic intrusive rocks in the north of the study area (e.g., Fire Lake area, anomaly #1). As of January 2004, much of the southern half of this area was available for staking, although partially covered by a OLL enhanced management area.

41. Margaret Lake area (Lorne and Louise townships) Cr, Rb, Zr, ±Pd, ±Pt, ±Zn, ±Li, ±Cs

Sites: 1128, 1131, 1141, 1143, 1144, 1151, 1153, 1155, 1158, 1159

This anomalous area consists of numerous lakes which returned anomalous lithophile elements including Cr. The bedrock geology consists of sedimentary rocks of the Hough Lake and Quirke Lake groups. The anomalous suite of elements at a few sites (1131, 1151, 1155, 1158) includes elevated Pt and/or Pd. Most of the anomalous lake sites in this area are relatively inorganic; this likely has biased the results in favor of the suite of dominantly lithophile elements listed above, including the Pd and Pt. As of January 2004, more than half of this anomalous area was available for staking.

42. Eden Lake area (Eden Township) ±Pd, ±Pt, ±Cu, ±Ni, ±Cd, ±Pb, ±Zn

Sites: 1044, 1069, 1070, 1072

The focus of this anomalous area is Eden Lake which returned elevated to anomalous levels of Pd, Pt, Cu and Ni. The general bedrock geology consists of felsic intrusive rocks in the west half and Huronian sediments underlying the east half (OGS 1991). The anomalous assemblage at Eden Lake suggests the possibility of a mafic source, possibly Nipissing gabbro.

As of January 2004, much of this area was available for staking, although the southern half is a OLL enhanced management area.

43. Levern Bay area (Jennings Township) Cu, Ni, ±Cr, ±Zn, ±As

Sites: 1509, 1541, 1543, 1544

The most interesting anomaly in this area is at site 1509, which returned anomalous Cu-Ni and elevated As. The other sites are elevated to anomalous with respect to Cr. The bedrock geology consists of migmatitic rocks and gneisses. As of January 2004, this area was available for staking.

44. Mud Lake area (Servos Township) Cu, Ni

Site: 1472

This area consists of a single lake site anomalous in Cu-Ni. The bedrock geology consists of felsic intrusive rocks, granitic gneiss and migmatite. As of January 2004, this area was available for staking.

Summary and Conclusions

Although there is a significant mining and urban signature in the geochemistry of the waters and lake sediments of the Sudbury area, and extensive ecological disturbance, this survey was able to effectively discriminate between surface (potentially contaminated) and deep (natural) lake sediments. These results indicate that sedimentation rates are variable and the sediment record of some lakes may have not been preserved. Despite this, the resulting geochemical "snapshot" of the region is significantly different than revealed by previous geochemical surveys (e.g., Friske et al. 1997), which appear to have a major anthropogenic component. The present survey was much more successful in "seeing" through 119 years of mining history and resolving a number of lake sediment anomalies that are relevant to explorationists in search of minerals.

Acknowledgments

The authors would like to thank Frank Brunton, Stewart Hamilton and Michael Easton of the OGS for reviewing portions of the draft manuscript. Thanks are also extended to Jay Jackson and Francis Roy for their support and efforts towards the production of this report.

References

Ascue J.M., Mudroch, A. and Rosa, F. 1994. Effects of abandoned gold mine tailings on the arsenic concentrations in water and sediments of Jack of Clubs Lake, B.C.; Environmental Technology, v.15, p.669-678

Bajc, A.F. 1997. Quaternary geology, north and east ranges, Sudbury Basin: west-central part; Ontario Geological Survey, Map 2520, scale 1:20 000.

Bajc, A.F. and Hall, G.E.M. 2000. Geochemical response of surficial media, north and east ranges, Sudbury Basin; Ontario Geological Survey, Open File Report 6033, 265p.

Barnett, P.J. and Bajc, A.F. 2002. Quaternary geology; *in* The physical environment of the City of Greater Sudbury, Ontario Geological Survey, Special Volume 6, p.56-85.

Barnett, P.J., Henry, A.P., and Babuin, D. 1991. Quaternary geology of Ontario, east-central sheet; Ontario Geological Survey, Map 2555, scale 1:1 000 000.

Bendell-Young, L.I., Harvey, H.H., Dillon, P.J. and Scholer, P.J. 1989. Contrasting behavior of manganese in the surficial sediments of thirteen south-central Ontario lakes; The Science of the Total Environment, v.87/88, p.129-139.

Bennett, G., Dressler, B.O. and Robertson, J.A. 1991. The Huronian Supergroup and associated intrusive rocks; *in* Geology of Ontario, Ontario Geological Survey, Special Volume 4, Part 1, p.549-591.

Cabri, L.J. and Laflamme, J.H.G. 1976. The mineralogy of the platinum group elements from some copper-nickel deposits of the Sudbury area, Ontario; Economic Geology, v.71, p.1159-1196.

City of Greater Sudbury 2001. City of Greater Sudbury's 2001 Lake Water Quality Initiative, Executive Summary; City of Greater Sudbury, Economic Development and Planning Services, Sudbury, Ontario, 15p.

——— 2003. Lake Water Quality Program, 2003 Annual Report; City of Greater Sudbury, Economic Development and Planning Services, Sudbury, Ontario, 32p.

Coker, W.B., Hornbrook, E.H.W. and Cameron, E.M. 1979. Lake sediment geochemistry applied to mineral exploration; *in* Geophysics and geochemistry in the search for metallic ores; Geological Survey of Canada, Economic Geology Report 31 p.435-478.

Coleman, A.P. 1901. The Vermilion River placers; Ontario Bureau of Mines, Annual Report 1901, v.X, p.151-159.

Cook, S.J. and McConnell, J.W. 2001. Lake sediment geochemical methods in the Canadian Shield, Cordillera and Appalachia; *in* Drift exploration in glaciated terrain, The Geological Society, Special Publication No. 185, p.125-149.

Davidson, A. and van Breemen, O. 1994. U-Pb ages of granites near the Grenville Front, Ontario, *in* Radiogenic age and isotopic studies: Report 8, Geological Survey of Canada, Current Research 1994-F, p.107-114.

Dickman, M. and Fortescue, J. 1984. Rates of lake acidification inferred from sediment diatoms for eight lakes located north of Lake Superior, Canada; Verhandlungen Internationale Vereinigung für Theoretische und Angewandte Limnologie, v.22, p.1345-1356.

——— 1991. The role of lake deacidification as inferred from sediment core diatom stratigraphies; AMBIO: A journal of the human environment, v.20, p.129-135.

Dixit, S.S., Dixit, A.S., Smol, J.P. and Keller, W. 1995. Reading the records stored in the lake eediments: a method of examining the history and extent of industrial damage to lakes; *in* Restoration and recovery of an industrial region: progress in restoring the smelter-damaged landscape near Sudbury, Canada, Springer-Verlag, New York, p.33-49.

Dressler, B.O. 1984. General geology of the Sudbury area; *in* The geology and ore deposits of the Sudbury structure, Ontario Geological Survey, Special Volume 1, p.57-82.

Dressler, B.O., Gupta, V.K. and Muir, T.L. 1991. The Sudbury structure; *in* Geology of Ontario, Ontario Geological Survey, Special Volume 4, Part 1, p.592-625.

Dyer, R.D., Bajc, A.F. and Jackson, R.G. 1996. Multi-media geochemical baseline study in the vicinity of the Cal Graphite deposit, Butt Township; Ontario Geological Survey, Open File Report 5947, 173p.

Easton, R.M. 1992. The Grenville Province and the Proterozoic history of central and southern Ontario; *in* Geology of Ontario, Ontario Geological Survey, Special Volume 4, Part 2, p.714-904.

Fortescue, J.A.C. 1988. A regional geochemical survey of part of the Batchawana greenstone belt, District of Algoma; *in* Summary of Field Work and Other Activities 1988, Ontario Geological Survey, Miscellaneous Paper 141, p.482-488.

Fortescue, J.A.C., Dickman, M. and Terasmae, J. 1984. Multidisciplinary follow up of pH observation in lakes north and east of Lake Superior, District of Algoma; Ontario Geological Survey, Open File Report 5483, 574p.

Fortescue, J.A.C. and Dyer, R.D. 1994. The geochemical map of Ontario pilot project Part I: Report on the 1992 80th meridian traverse; Ontario Geological Survey, Open File Report 5907, 307p.

Friske, P.W.B. 1991. The application of lake sediment geochemistry in mineral exploration; *in* Exploration Geochemistry Workshop, Geological Survey of Canada, Open File 2390, p.4-1 to 4-20.

——— 1995: Effects of limnological variation on element distribution in lake sediments from Tatin Lake, central British Columbia—implications for the use of lake sediment data in exploration and environmental studies; *in* Current Research 1995-E; Geological Survey of Canada, p.59-67.

Friske, P.W.B, McCurdy, M.W. and Day, S.J.A. 1997: National Geochemical Reconnaissance, Ontario compilation: nickel in lake sediment, Ontario; Geological Survey of Canada, Open File 3379a, scale 1:500 000.

Friske, P.W.B., McCurdy, M.W., Day, S.J.A. and Adcock, S.W. 1994: National geochemical reconnaisance, Ontario compilation, copper in lake sediment, Ontario; Geological Survey of Canada, Open File 2959, scale 1:1 500 000.

Fyon, J.A., Bennett, G., Jackson, S.L., Garland, M.I. and Easton, R.M. 1991. Metallogeny of the Proterozoic eon, northern Great Lakes region, Ontario; *in* Geology of Ontario, Ontario Geological Survey, Special Volume 4, Part 2, p.1176-1215.

Gunn, J.M. and Keller, W. 1995. Urban lakes: integrators of environmental damage and recovery; *in* Restoration and recovery of an industrial region: progress in restoring the smelter-damaged landscape near Sudbury, Canada, Springer-Verlag, New York, p.257-269.

Hornbrook, E.H.W. and Friske, P.W.B. 1988. Regional lake sediment and water geochemical reconnaissance data, Bruce area, Ontario; Geological Survey of Canada, Open File 1639, 141p.

Hunt, C. 2003. Metal concentrations and algal microfossil diversity in pre-industrial (pre-1880) sediment of lakes located on the Sudbury Igneous Complex in Sudbury, Ontario; unpublished MSc thesis, Laurentian University, Sudbury, Ontario, 124p.

Innes, D.G. and Colvine, A.C. 1984. The regional metallogenetic setting of Sudbury; *in* The geology and ore deposits of the Sudbury structure, Ontario Geological Survey, Special Volume 1, p.45-56.

James, R.S., Easton, R.M., Peck, D.C. and Hrominchuk, J.L. 2002. The East Bull Lake intrusive suite: remnants of a ~2.48 Ga large igneous and metallogenic province in the Sudbury area of the Canadian Shield; Economic Geology, v.97, p.1577-1606.

Johnson, M.G., Culp, L.R. and George, S.E. 1986. Temporal and spatial trends in metal loadings to sediments of the Turkey Lakes, Ontario; Canadian Journal of Fisheries and Aquatic Sciences, v.43, p.754-762.

Jonasson, I.R. 1976. Detailed hydrogeochemistry of two small lakes in the Grenville geological province; Geological Survey of Canada, Paper 76-13, 37p.

Krogh, T.E., Davis, D.W. and Corfu, F. 1984. Precise U-Pb zircon and baddeleyite ages for the Sudbury area; *in* The geology and ore deposits of the Sudbury structure, Ontario Geological Survey, Special Volume 1, p.431-466.

LeBourdais, D.M. 1953. Sudbury Basin: The story of nicke; The Ryerson Press, Toronto, Ontario.

Lynch, J. 1990. Provisional elemental values for eight new geochemical lake sediment and stream sediment reference materials LKSD-1, LKSD-2, LKSD-3, LKSD-4, STSD-1, STSD-2, STSD-3 and STSD-4; Geostandards Newsletter, v.14, no.1, p.153-167.

Meyer, G., Cosec, M., Grabowski, G.P.B., Guidon, D.L., Beauchamp, S. and Chaloux, E.C. 2003. Report of Activities 2002, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake and Sudbury Districts; Ontario Geological Survey, Open File Report 6114, 72p.

Muir, T.L. and Peredery, W.V. 1984. The Onaping Formation; *in* The geology and ore deposits of the Sudbury structure, Ontario Geological Survey, Special Volume 1, p.139-210.

Naldrett, A.J., Hewins, R.H., Dressler, B.O. and Rao, B.V. 1984. The Contact Sublayer of the Sudbury Igneous Complex; *in* The geology and ore deposits of the Sudbury structure, Ontario Geological Survey, Special Volume 1, p.253-274.

Neary, B.P., Dillon, P.J., Munro, J.R. and Clark, B.J. 1990. The acidification of Ontario Lakes: an assessment of their sensitivity and current status with respect to biological damage; technical report, Ministry of the Environment, Dorset, Ontario, 171p.

Ontario Geological Survey 1991. Bedrock geology of Ontario, east-central sheet; Ontario Geological Survey, Map 2543, scale 1:1 000 000.

——— 2002. Mineral Deposit Inventory Version 2 (MDI2), October 2002 Release; Ontario Geological Survey.

Pearson, D.A.B., Lock, A.S., Gomm, A. and Graham, P. 1999. Background for a remediation plan: characterizing sediment and water chemistry in Kelly Lake, Ontario – A lake contaminated by sewage effluent and high levels of copper and nickel from mining and smelting; Sudbury '99 Mining & the Environment II, Volume 2: Conference Proceedings, p.681-690.

Pearson, D.A.B., Gunn, J.M. and Keller, W. 2002a. The past, present and future of Sudbury's lakes; *in* The physical environment of the City of Greater Sudbury, Ontario Geological Survey, Special Volume 6, p.195-215.

Pearson, D.A.B., Lock, A.S., Belzile, N. and Bowins, R.J. 2002b. Assessing Kelly Lake's history as a natural rrap for mining industry and municipal effluent during the growth of Sudbury; *in* The physical environment of the City of Greater Sudbury, Ontario Geological Survey, Special Volume 6, p.175-192.

Rasmussen, P.E. 1993. The environmental significance of geological sources of mercury: a Precambrian Shield watershed study; unpublished PhD thesis, University of Waterloo, Waterloo, Ontario, 379p.

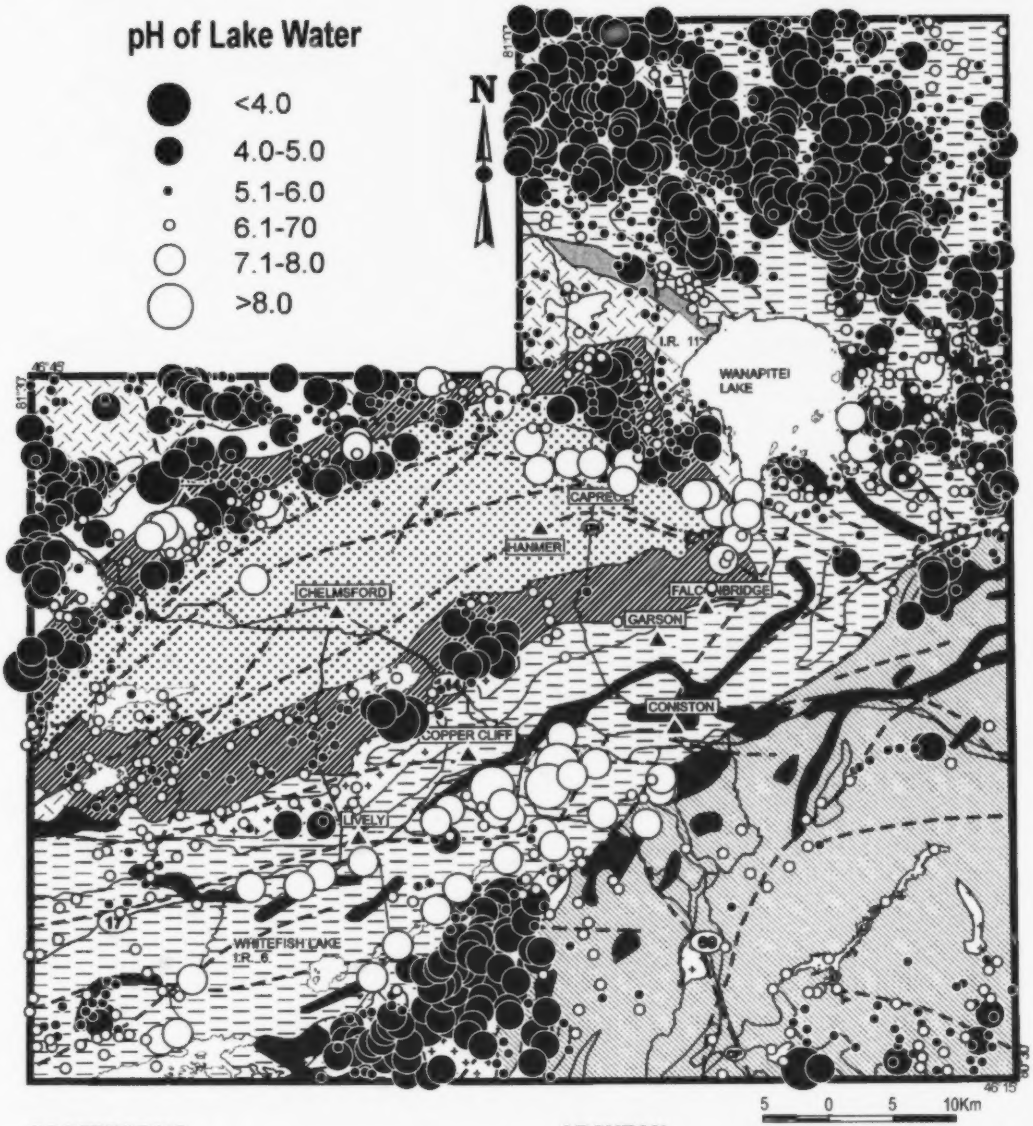
Rousell, D.H. 1998. Bedrock geology of the Regional Municipality of Sudbury; Ontario Geological Survey, Preliminary Map P.3187, scale 1:100 000.

Rousell, D.H., Meyer, W. and Prevec, S.A. 2002. Bedrock geology and mineral deposits; *in* The physical environment of the City of Greater Sudbury, Ontario Geological Survey, Special Volume 6, p.20-55.

Winderhalder, K. 1995. Early history of human activities in the Sudbury area and ecological damage to the landscape; *in* Restoration and recovery of an industrial region: progress in restoring the smelter-damaged landscape near Sudbury, Canada, Springer-Verlag, New York, p.7-31.

Appendix A

Proportional Dot Maps of Lake Water pH, Electrical Conductivity, Lake Depth and Sediment Loss-on-Ignition (LOI)

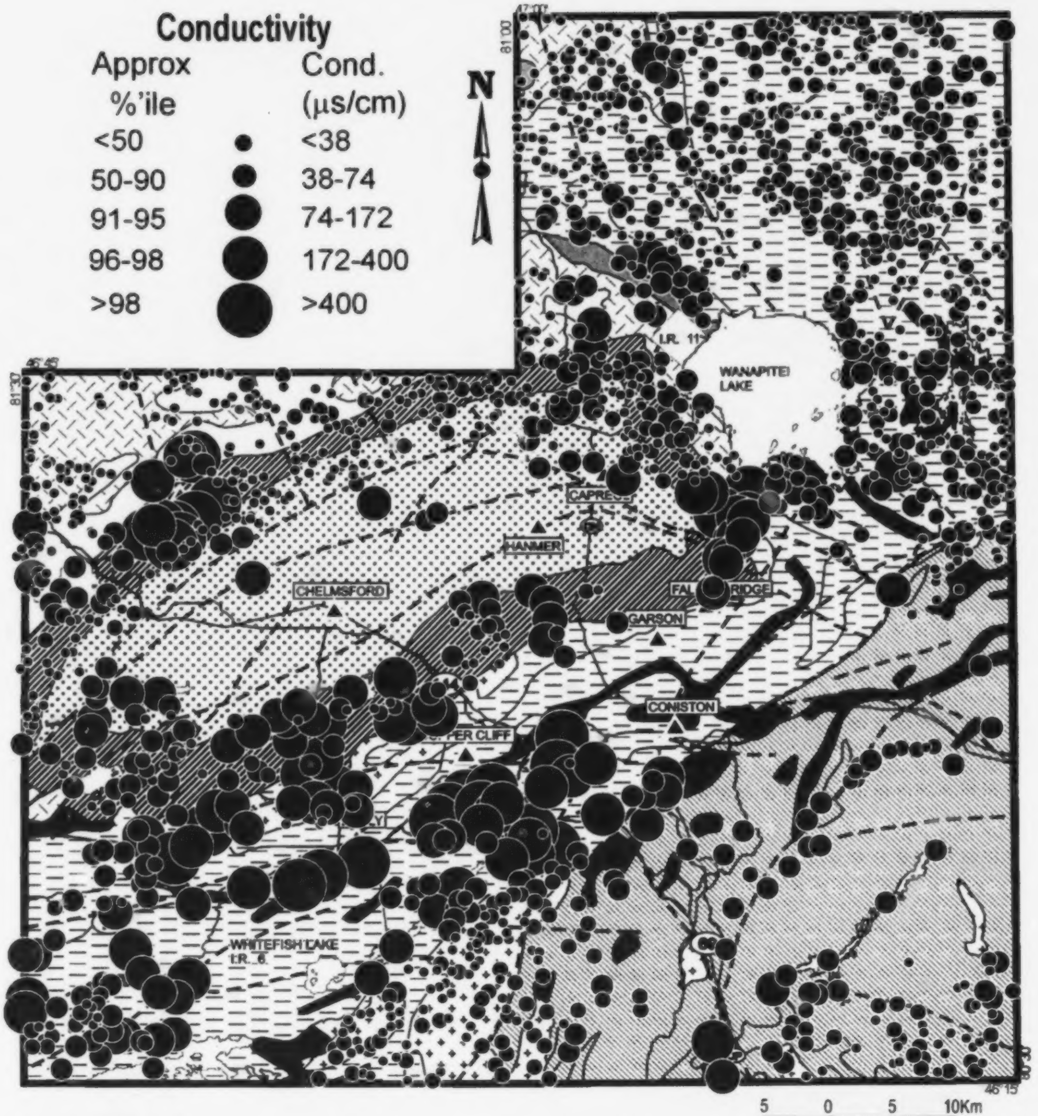

pH of Lake Water
<4.0
4.0-5.0
5.1-6.0
6.1-70
7.1-8.0
>8.0
N
81°37'
46°46'
81°37'
I.R. 11
WANAPITEI LAKE
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
69
80°30'
46°15'
5 0 5 10Km

PROTEROZOIC

⁺	Felsic intrusive rocks
▒	Migmatitic rocks and gneisses (Grenville Province)
■	Mafic intrusive rocks
▨	Norite, gabbro (Sudbury igneous complex)
░	Fragmentals, mudstone, wackes (Whitewater Gp.)
☰	Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

▧	Massive granodiorite to granite
□	Gneissic Tonalite
■	Mafic and ultramafic intrusive rocks
▒	Mafic to intermediate metavolcanic rocks
⁄	Faults

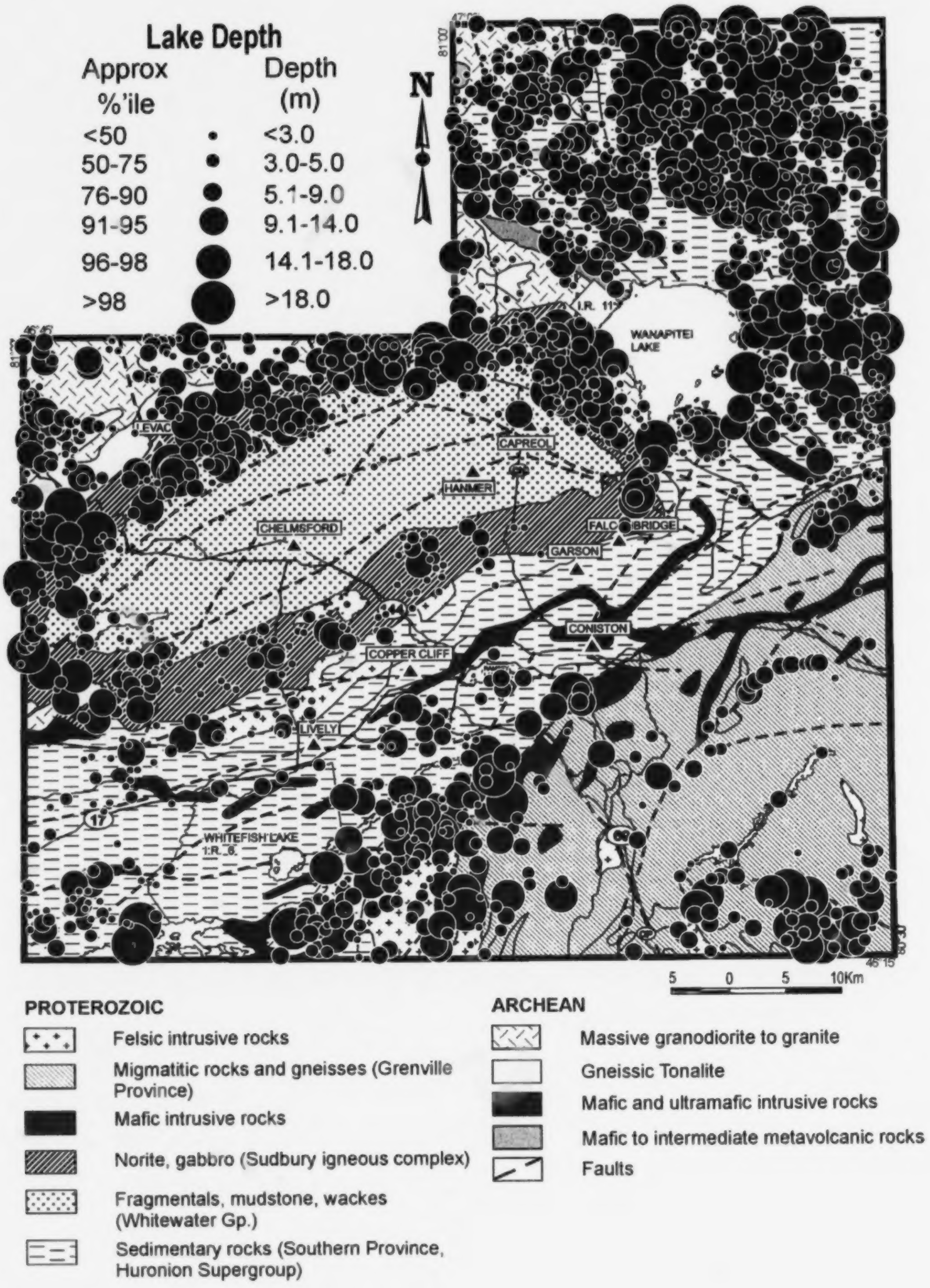

Conductivity
Approx %'ile
Cond. (µs/cm)
<50 <38
50-90 38-74
91-95 74-172
96-98 172-400
>98 >400
N
47°00'
81°00'
46°45'
81°30'
46°15'
I.R. 11
WANAPITEI LAKE
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
WHITEFISH LAKE I.R. 6
5 0 5 10Km

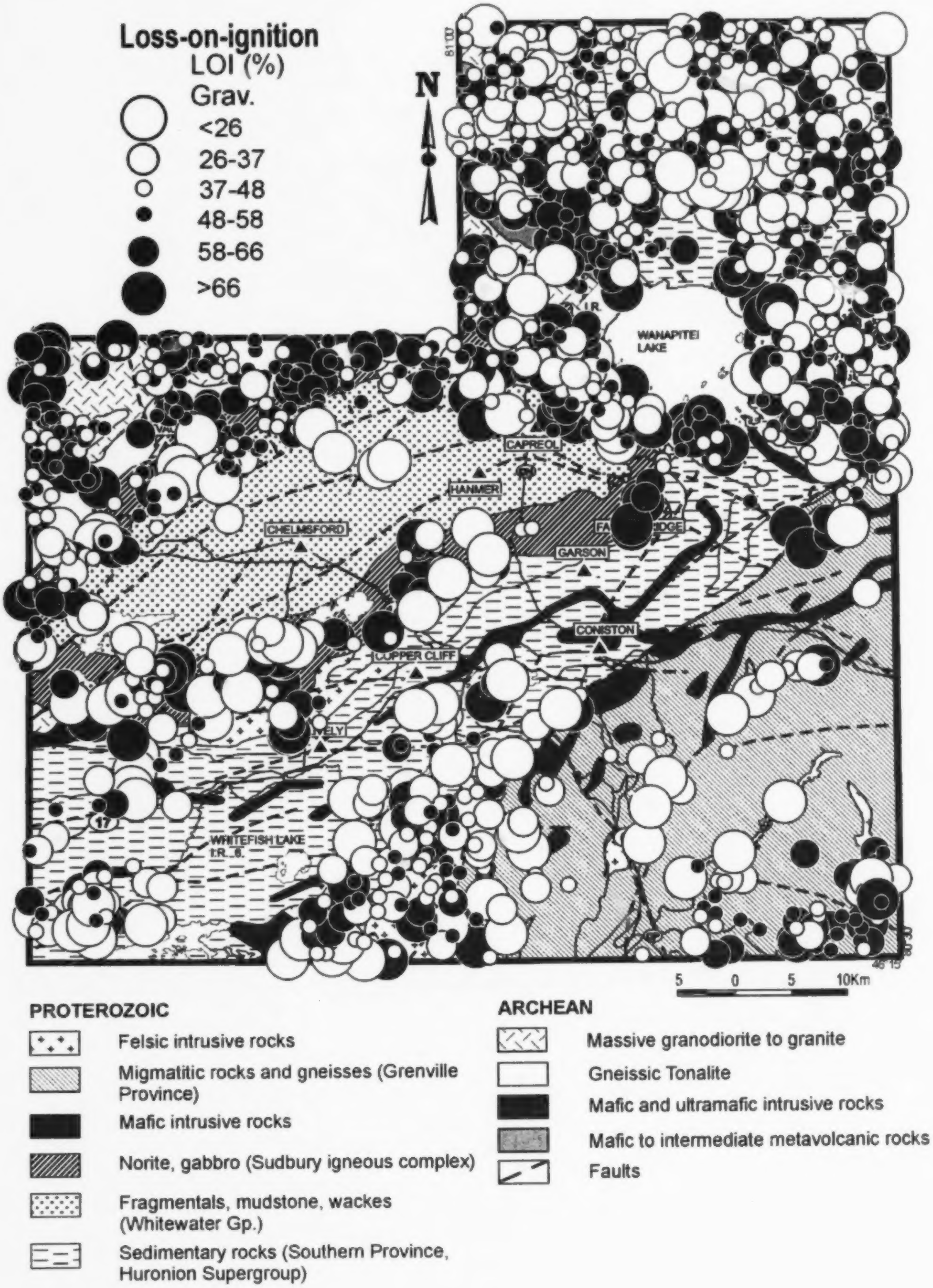
PROTEROZOIC

- ⁘ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⁘ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

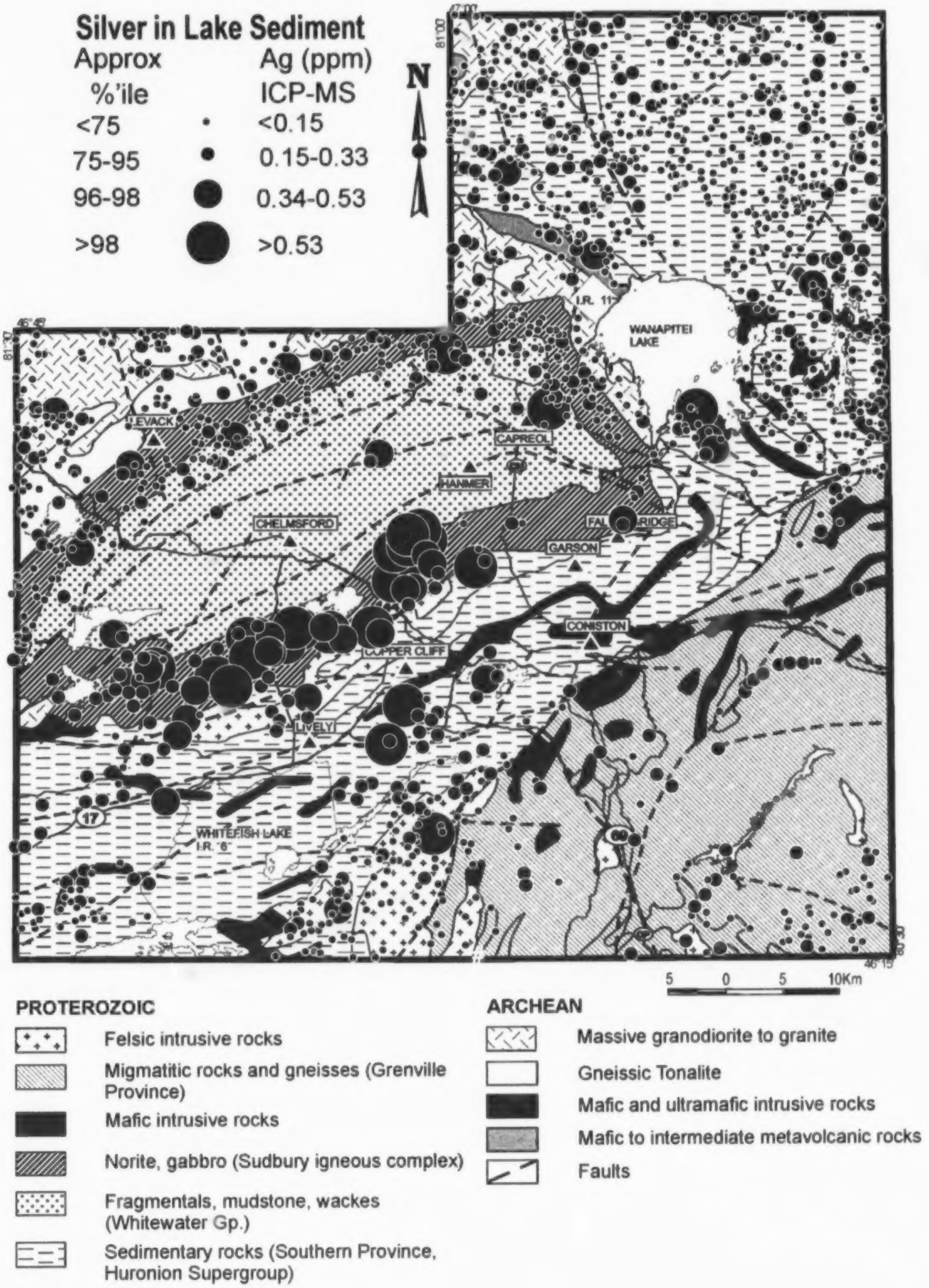
- ▨ Massive granodiorite to granite
- ☐ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▨ Mafic to intermediate metavolcanic rocks
- ⟋ Faults

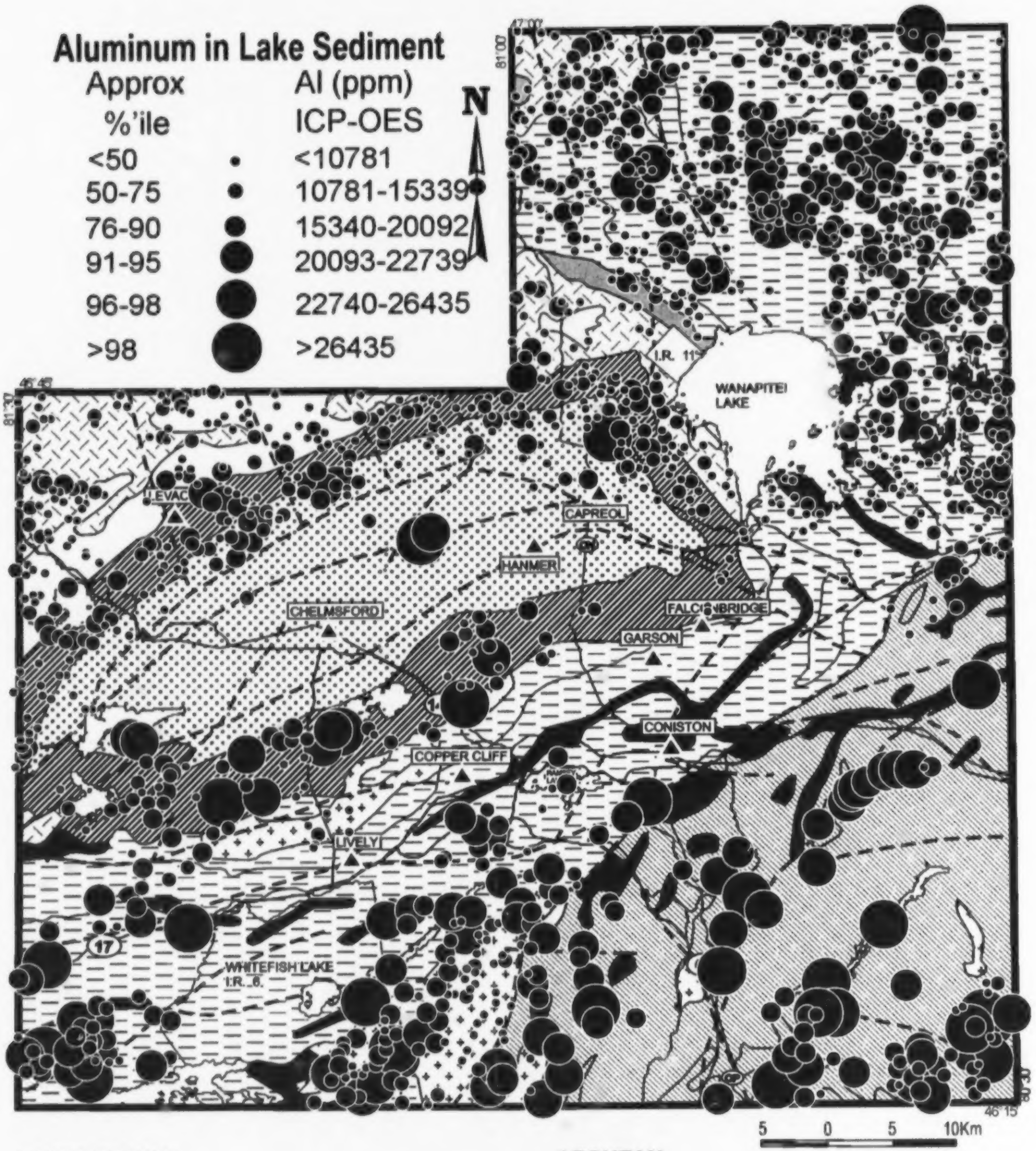

Lake Depth
Approx %'ile
Depth (m)
<50 ● <3.0
50-75 ● 3.0-5.0
76-90 ● 5.1-9.0
91-95 ● 9.1-14.0
96-98 ● 14.1-18.0
>98 ● >18.0
N
WANAPITEI LAKE
I.R. 11
LEVAC
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
46°15'
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults


Loss-on-ignition
LOI (%)
Grav.
<26
26-37
37-48
48-58
58-66
>66
N
81°00'
WANAPITEI LAKE
I.R.
CAPREOL
HANMER
CHELMSFORD
FA
IDGE
GARSON
CONISTON
COPPER CLIFF
IVELY
17
WHITEFISH LAKE
I.R. 6
46°15'
5
0
5
10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

Appendix B

Proportional Dot Maps of Ag, Al, As, Ba, Be, Br, Ca, Cd, Ce, Co, Cr, Cs, Cu, Fe, Hg, K, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Pd, Pt, PGEs (Pd+Pt+Rh+Ir), Rb, Total REEs (Nd to Lu), S, Sb, Sc, Sn, Sr, Th, Ti, U, V, W, Zn and Zr in Lake Sediment


Silver in Lake Sediment
Approx %'ile
Ag (ppm) ICP-MS
<75 • <0.15
75-95 • 0.15-0.33
96-98 ● 0.34-0.53
>98 ● >0.53
N
47°00'
81°00'
46°45'
81°37'
80°30'
46°15'
I.R. 11
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
69
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

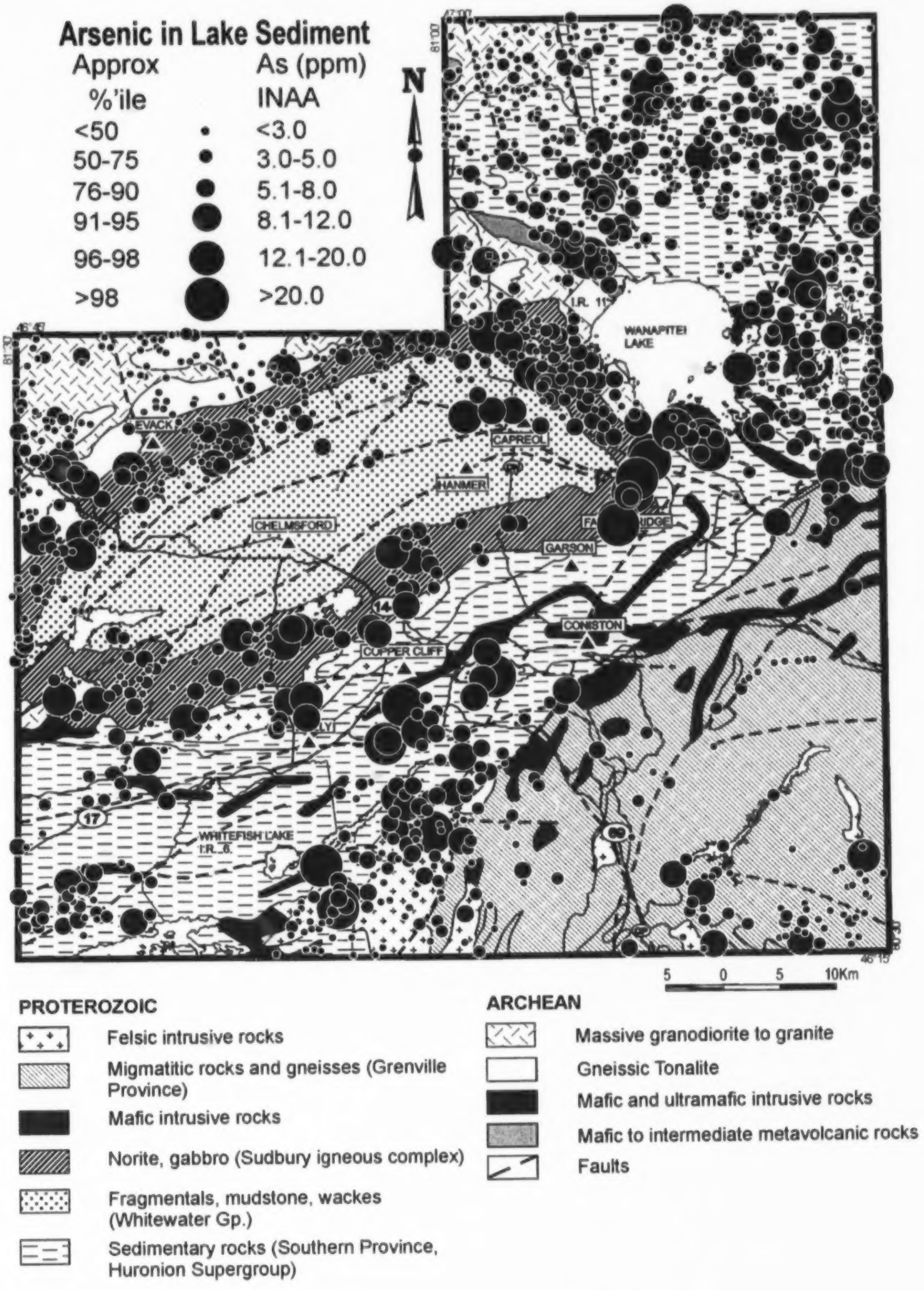

Aluminum in Lake Sediment
Approx %'ile
Al (ppm) ICP-OES
<50 • <10781
50-75 • 10781-15339
76-90 ● 15340-20092
91-95 ● 20093-22739
96-98 ● 22740-26435
>98 ● >26435
N
47°00'
81°00'
46°45'
81°30'
46°15'
80°30'
I.R. 11
WANAPITEI LAKE
LEVAC
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
5 0 5 10Km

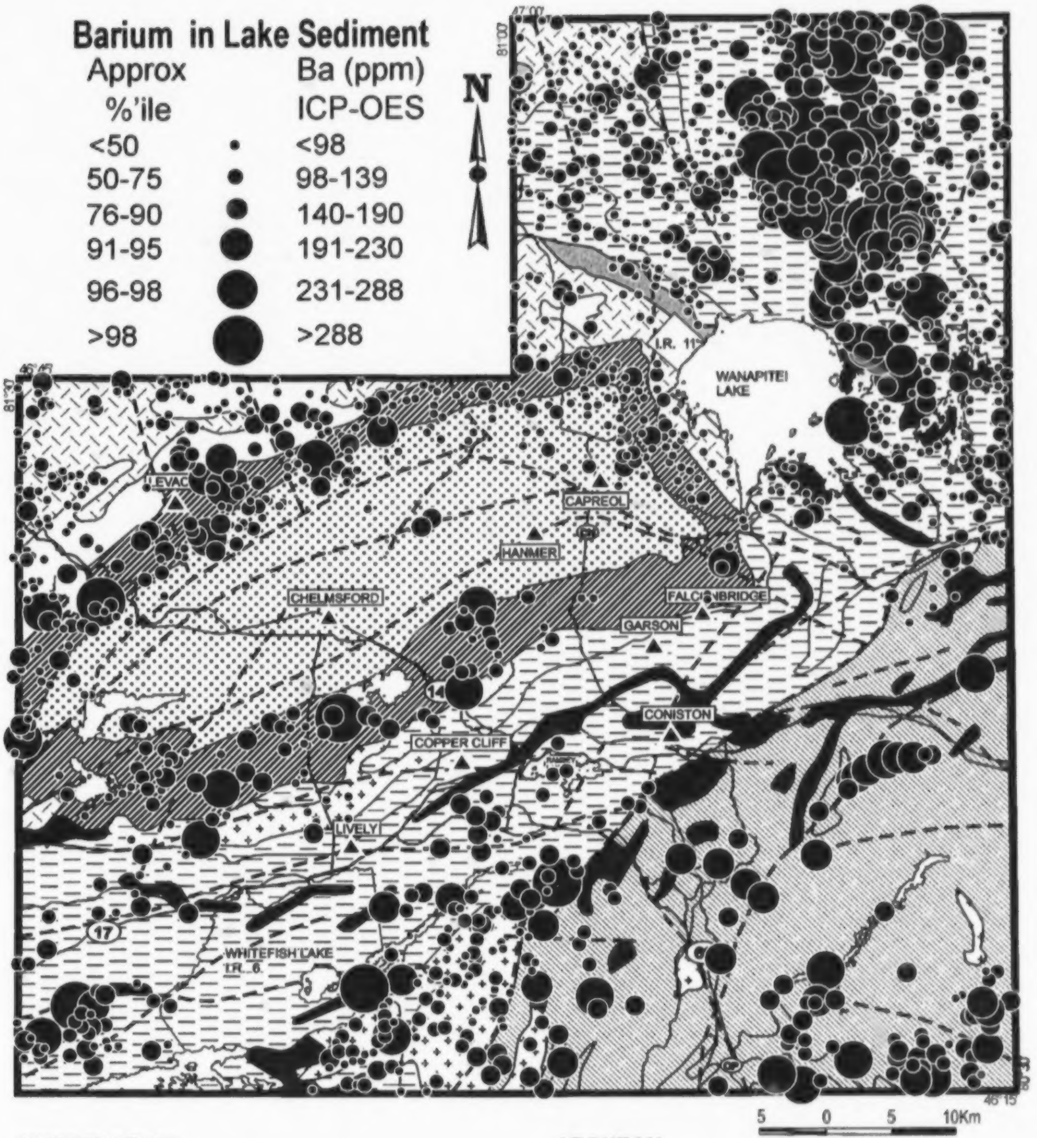
PROTEROZOIC

- ⁺⁺ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⁘ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

- ▨ Massive granodiorite to granite
- □ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▨ Mafic to intermediate metavolcanic rocks
- ⟋ Faults

Arsenic in Lake Sediment
Approx %'ile
As (ppm) INAA
<50 ● <3.0
50-75 ● 3.0-5.0
76-90 ● 5.1-8.0
91-95 ● 8.1-12.0
96-98 ● 12.1-20.0
>98 ● >20.0
N
47°00
81°00
46°45
81°30
46°15
80°30
EVACK
CAPREOL
HANMER
CHELMSFORD
GARSON
FA RIDGE
CONISTON
COPPER CLIFF
LY
WANAPITEI LAKE
I.R. 11
WHITEFISH LAKE I.R. 6
144
17
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

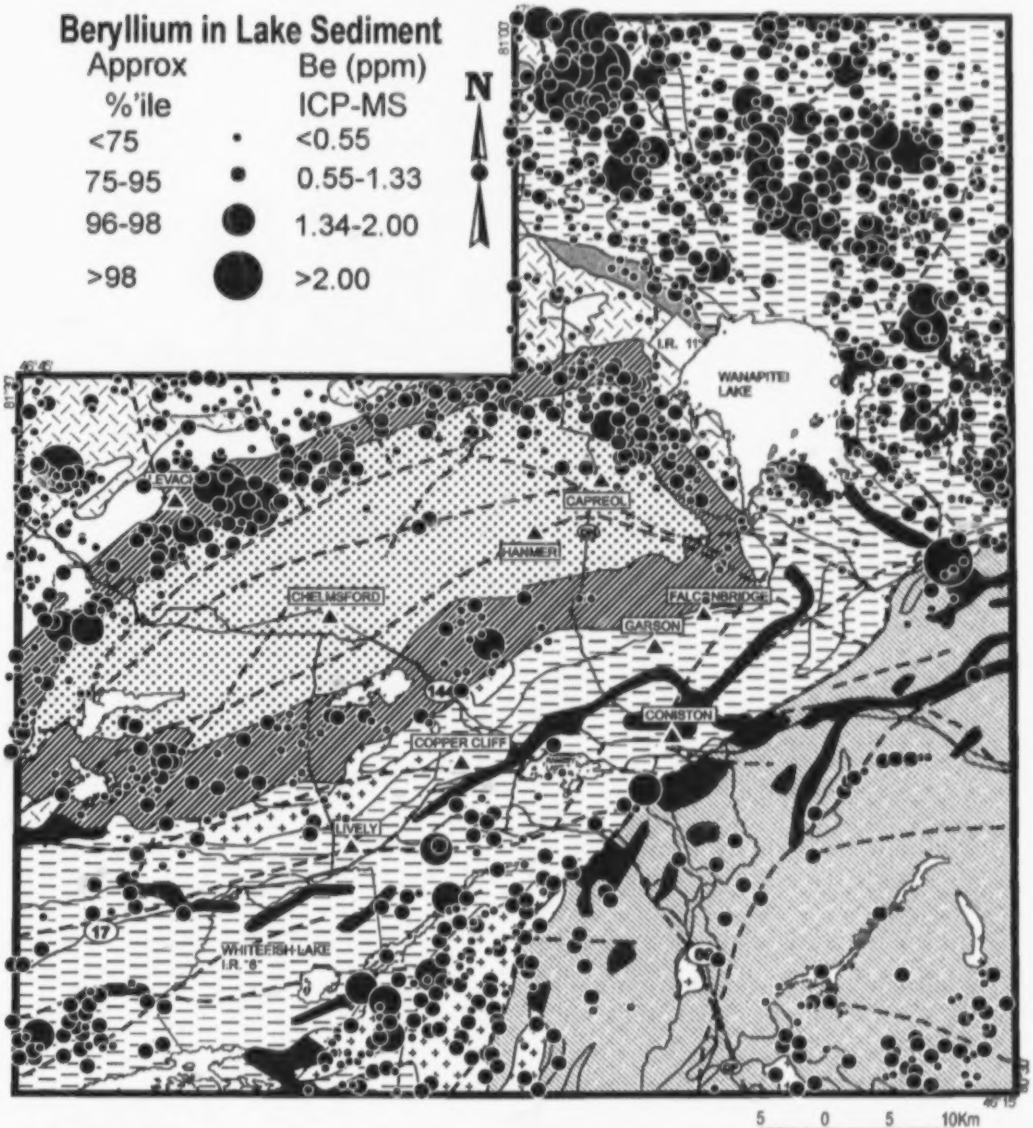

Barium in Lake Sediment
Approx %'ile
Ba (ppm) ICP-OES
<50 <98
50-75 98-139
76-90 140-190
91-95 191-230
96-98 231-288
>98 >288
N
47°07'
81°02'
46°45'
81°37'
46°15'
80°40'
WANAPITEI LAKE
I.R. 11
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
144
17
WHITEFISH LAKE I.R. 6
5 0 5 10Km

PROTEROZOIC

- ⁺ Felsic intrusive rocks
- ▒ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⠿ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

- ▧ Massive granodiorite to granite
- ☐ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▒ Mafic to intermediate metavolcanic rocks
- ⁄ Faults

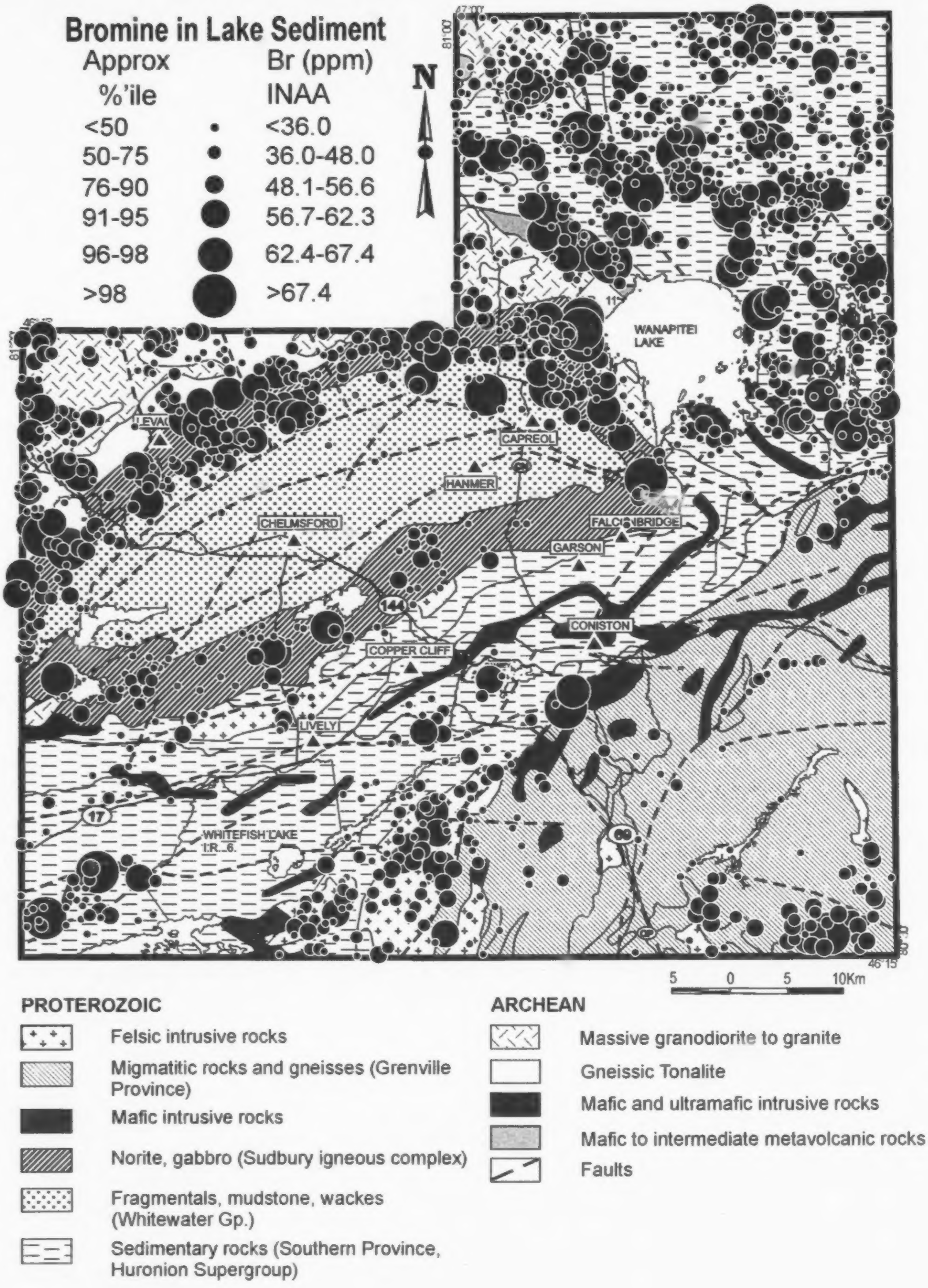

Beryllium in Lake Sediment
Approx %'ile
Be (ppm) ICP-MS
<75
<0.55
75-95
0.55-1.33
96-98
1.34-2.00
>98
>2.00
N
81°00'
81°37'
46°45'
46°15'
I.R. 11
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
144
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. "6"
5 0 5 10Km

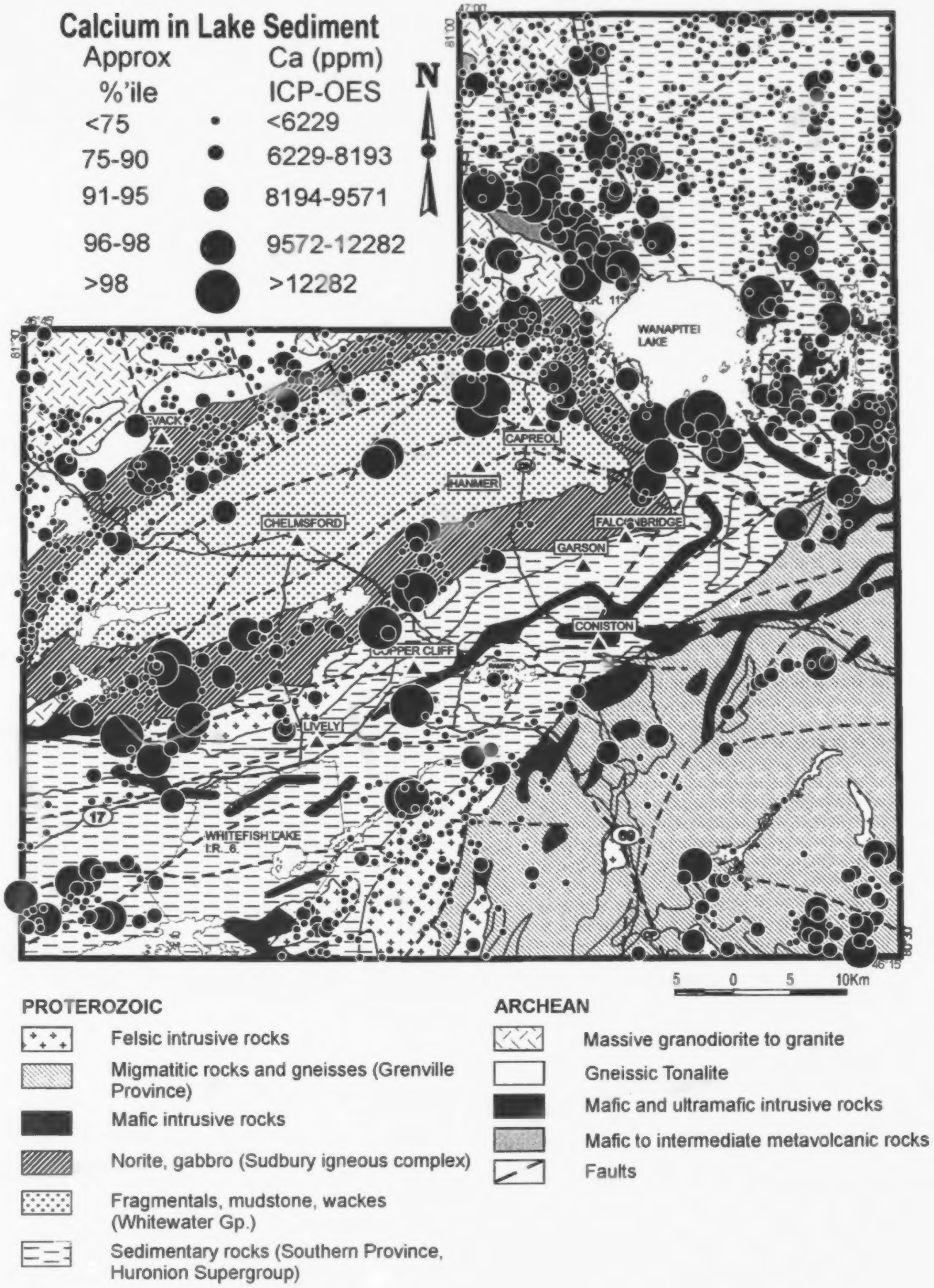
PROTEROZOIC

⁺⁺	Felsic intrusive rocks
▨	Migmatitic rocks and gneisses (Grenville Province)
■	Mafic intrusive rocks
▨	Norite, gabbro (Sudbury igneous complex)
⁚⁚	Fragmentals, mudstone, wackes (Whitewater Gp.)
☰	Sedimentary rocks (Southern Province, Huronion Supergroup)

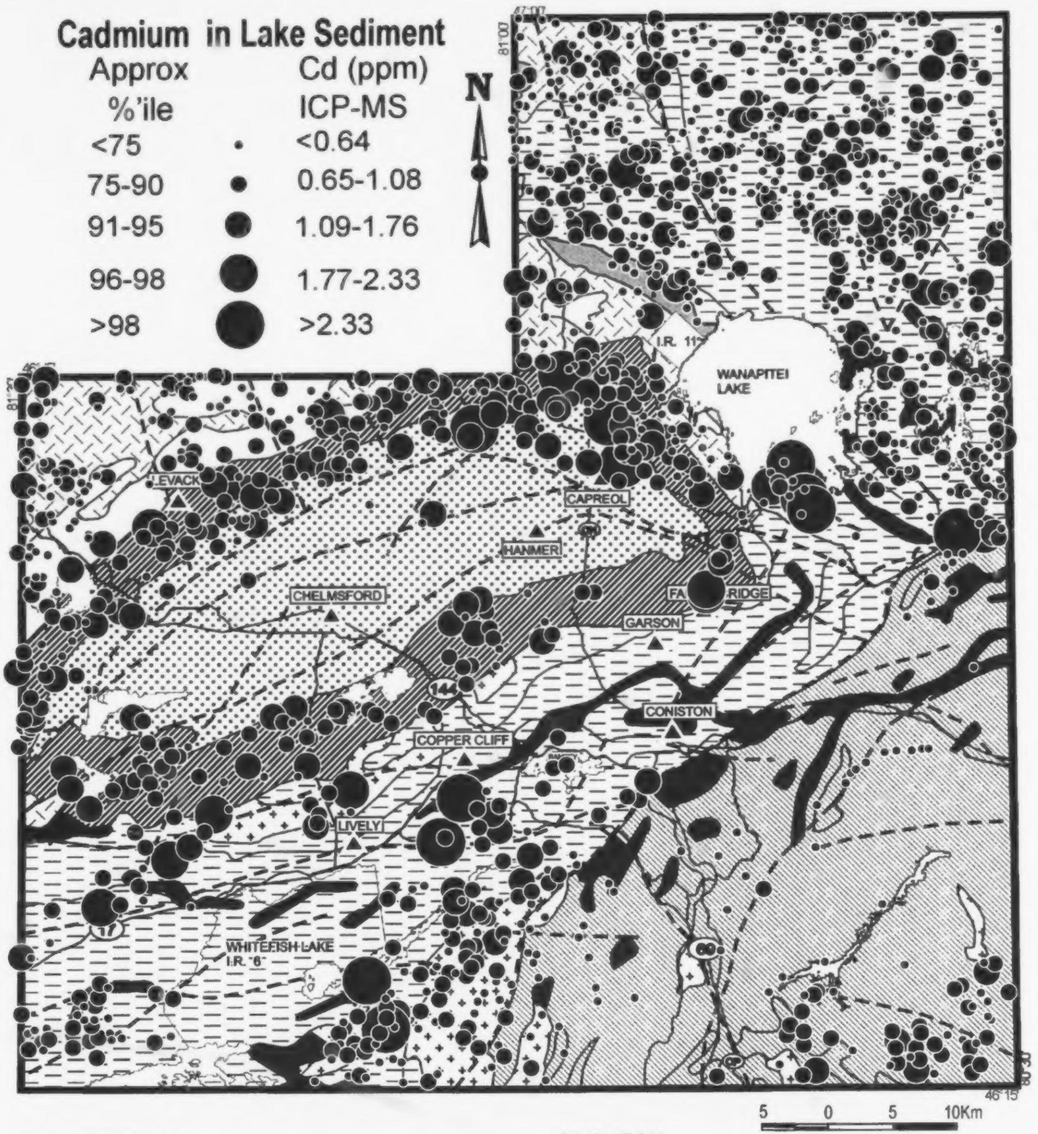
ARCHEAN

▨	Massive granodiorite to granite
☐	Gneissic Tonalite
■	Mafic and ultramafic intrusive rocks
▩	Mafic to intermediate metavolcanic rocks
⁄	Faults


Bromine in Lake Sediment
Approx %'ile
Br (ppm) INAA
<50 • <36.0
50-75 • 36.0-48.0
76-90 ● 48.1-56.6
91-95 ● 56.7-62.3
96-98 ● 62.4-67.4
>98 ● >67.4
N
47°00'
81°00'
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
144
17
69
46°15'
80°15'
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults



Calcium in Lake Sediment
Approx %'ile
Ca (ppm) ICP-OES
<75 • <6229
75-90 ● 6229-8193
91-95 ● 8194-9571
96-98 ● 9572-12282
>98 ● >12282
N
47°00'
81°00'
46°45'
81°30'
46°15'
80°30'
WANAPITEI LAKE
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
17
69
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

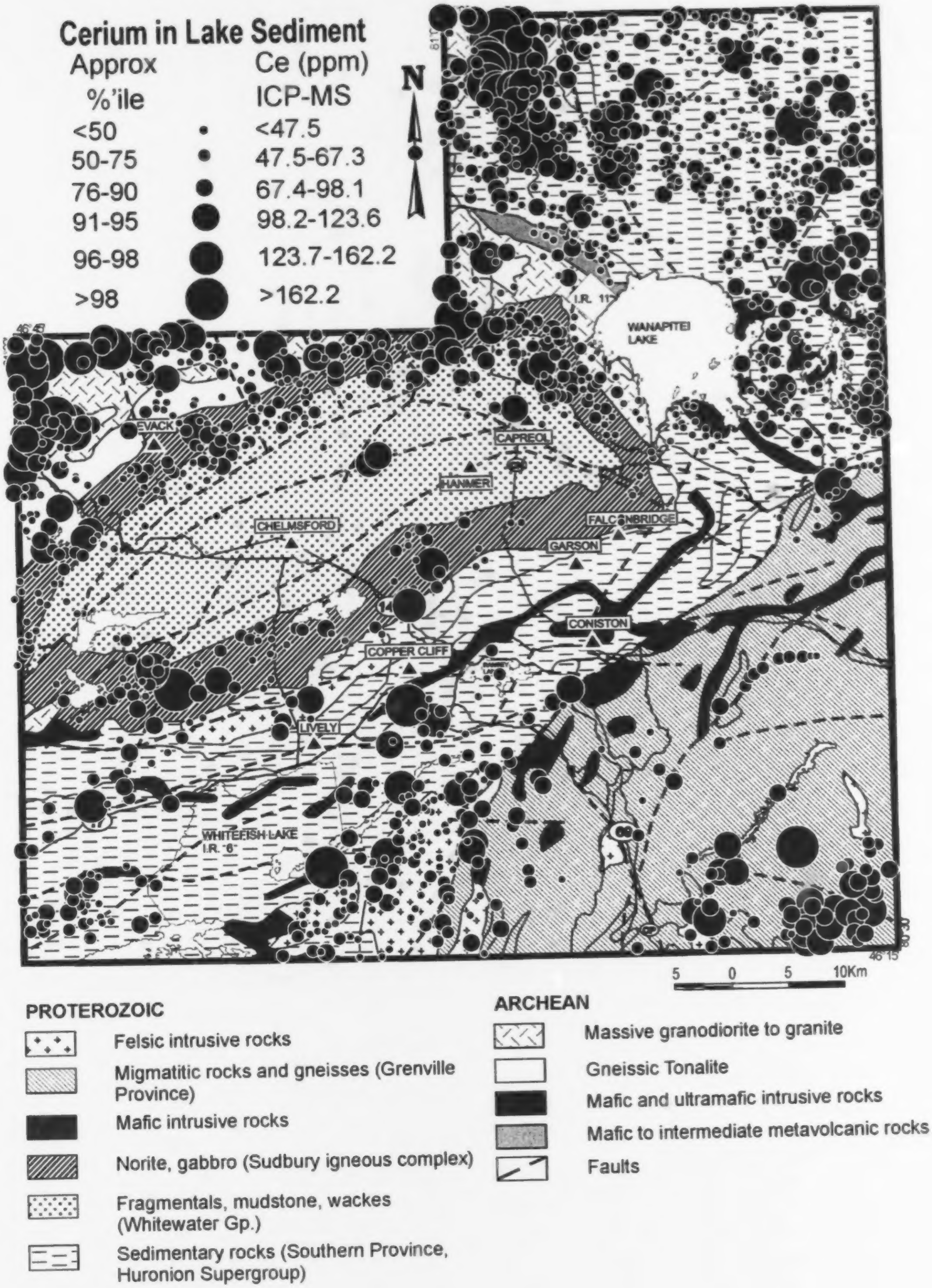

Cadmium in Lake Sediment
Approx %'ile
Cd (ppm) ICP-MS
<75 <0.64
75-90 0.65-1.08
91-95 1.09-1.76
96-98 1.77-2.33
>98 >2.33
N
47°00'
81°00'
I.R. 11
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
144
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. "6"
69
46°15'
80°30'
5 0 5 10Km

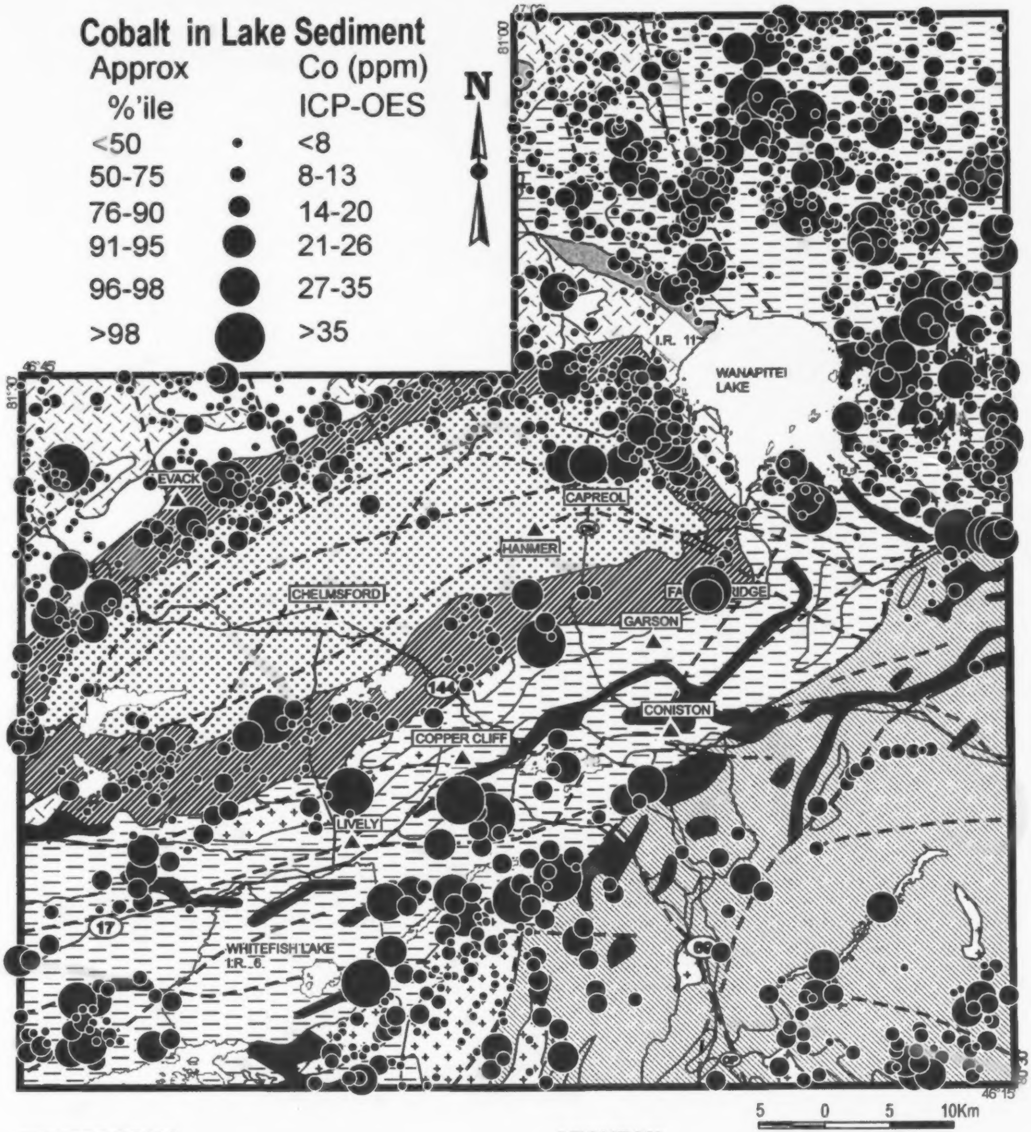
PROTEROZOIC

- ⁘ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⁘ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

- ▨ Massive granodiorite to granite
- ☐ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▒ Mafic to intermediate metavolcanic rocks
- ⟋ Faults


Cerium in Lake Sediment
Approx %'ile
Ce (ppm) ICP-MS
<50 <47.5
50-75 47.5-67.3
76-90 67.4-98.1
91-95 98.2-123.6
96-98 123.7-162.2
>98 >162.2
N
46°45'
81°
80°30'
46°15'
I.R. 11
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. "6"
144
69
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults



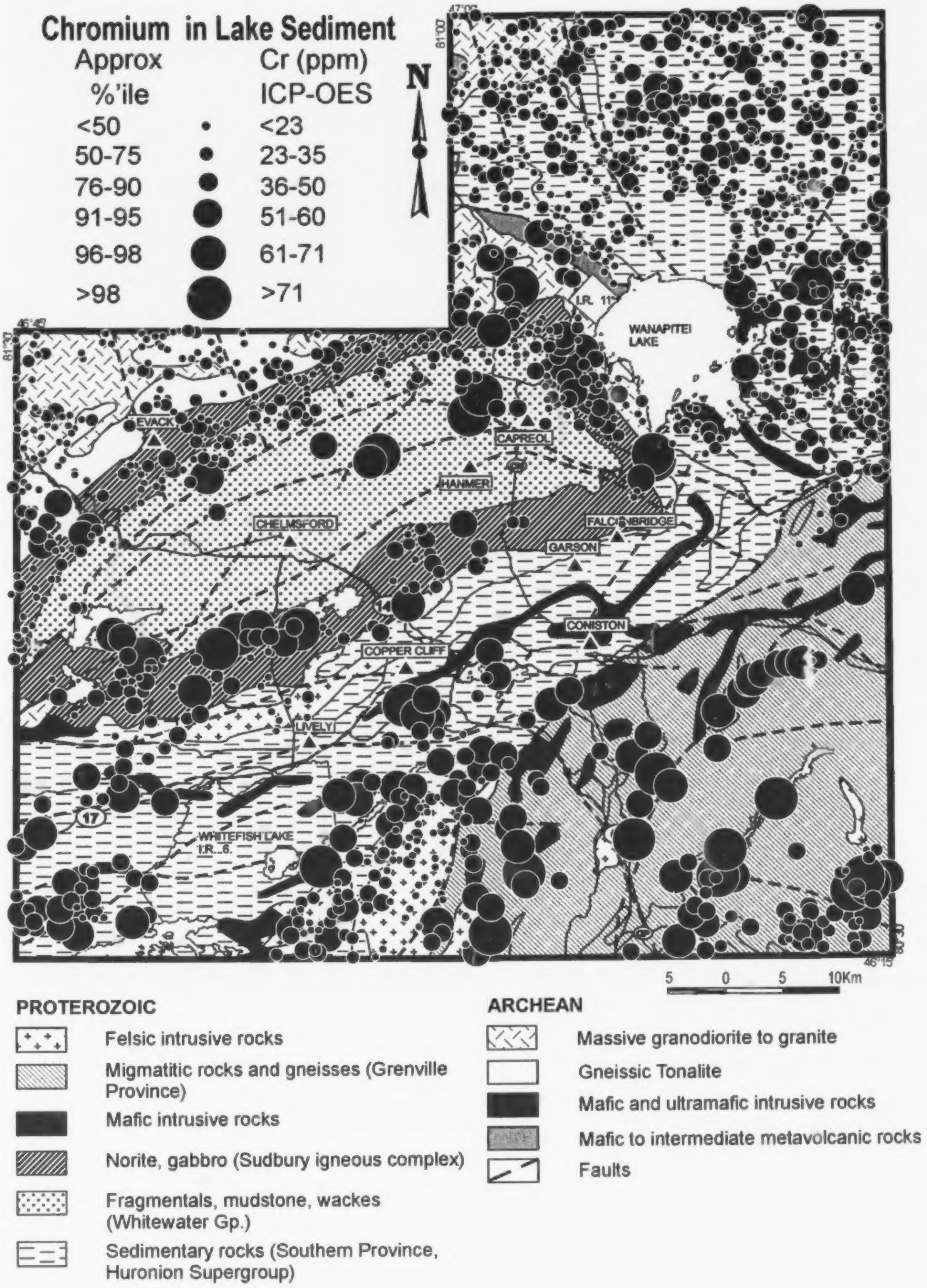
Cobalt in Lake Sediment
Approx %'ile
Co (ppm) ICP-OES
<50 <8
50-75 8-13
76-90 14-20
91-95 21-26
96-98 27-35
>98 >35
N
47°00'
81°00'
46°45'
81°30'
46°15'
80°30'
I.R. 11
WANAPITEI LAKE
EVACK
CAPREOL
HANMER
CHELMSFORD
FA
IDGE
GARSON
144
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
69
5 0 5 10Km

PROTEROZOIC

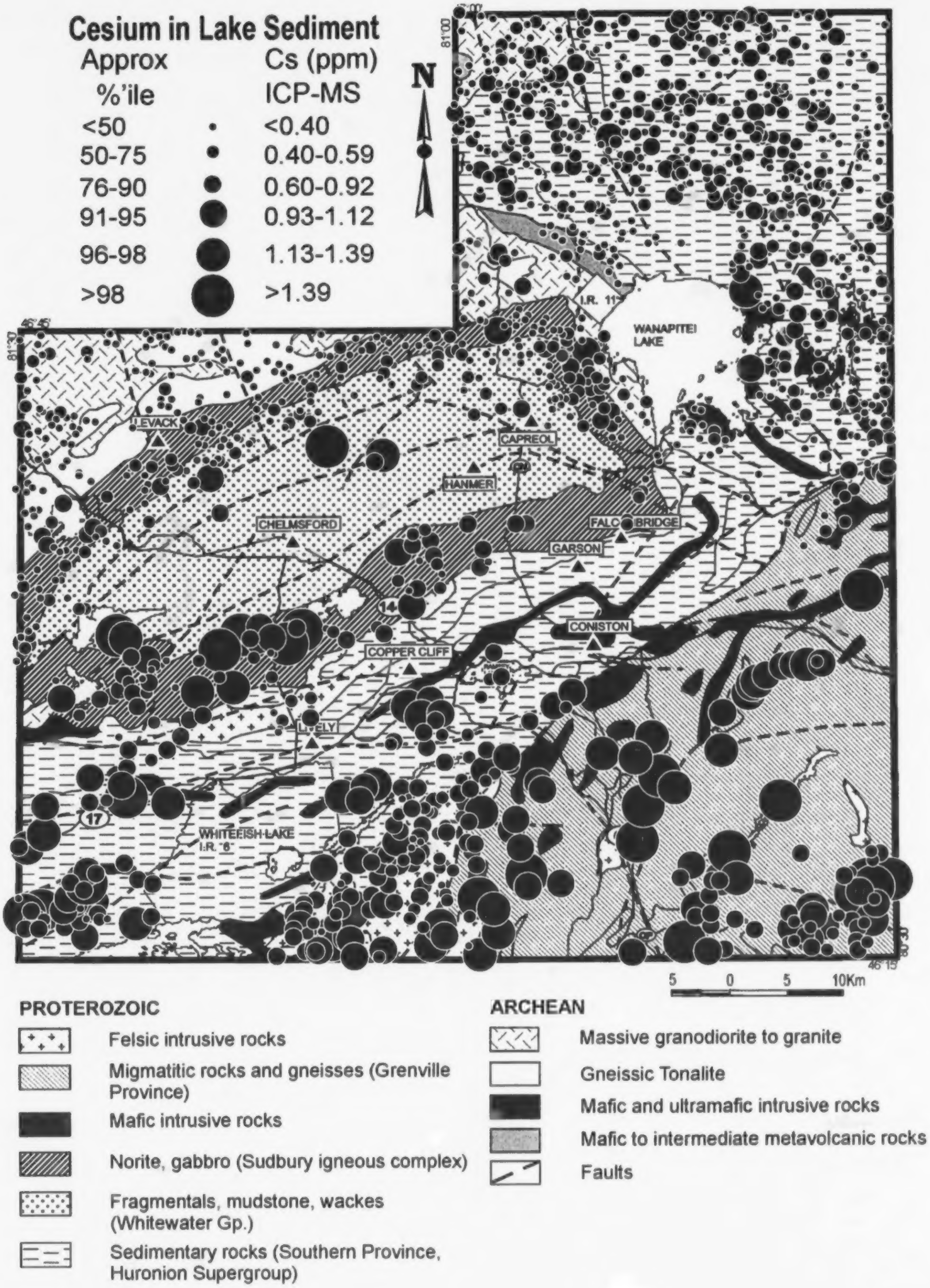
- ⁺ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⁘ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

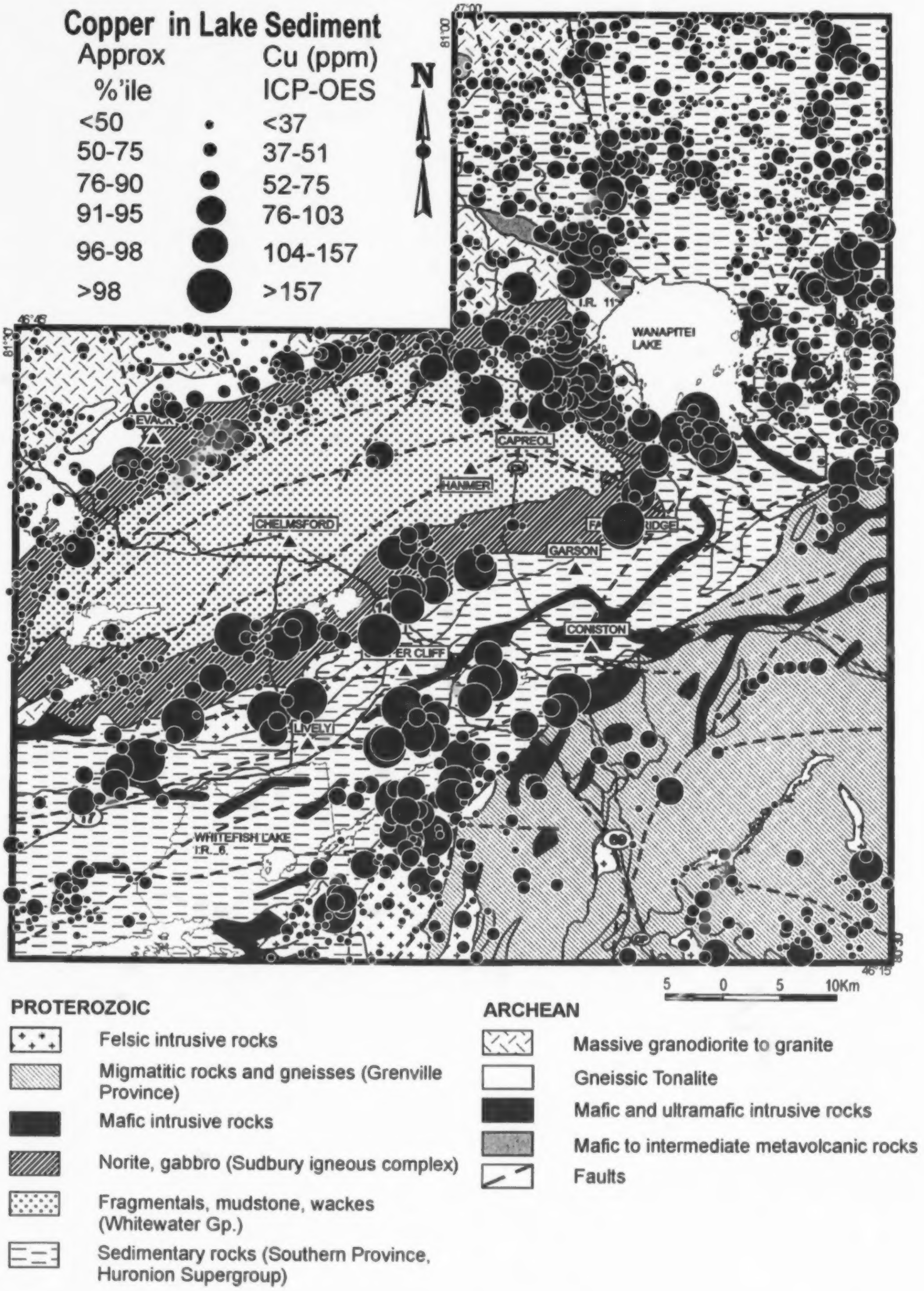
ARCHEAN

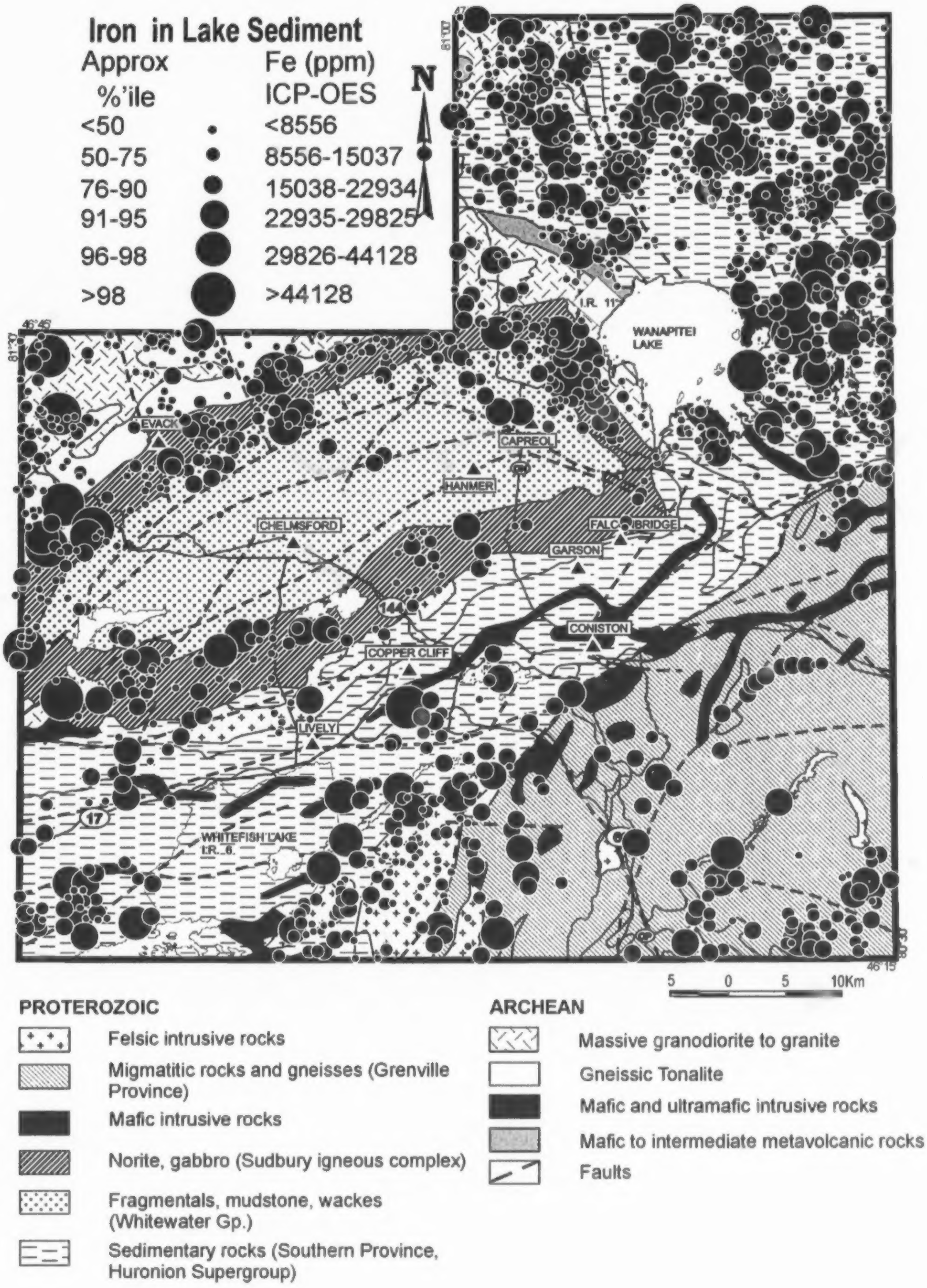
- ▨ Massive granodiorite to granite
- ☐ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▒ Mafic to intermediate metavolcanic rocks
- ⟋ Faults

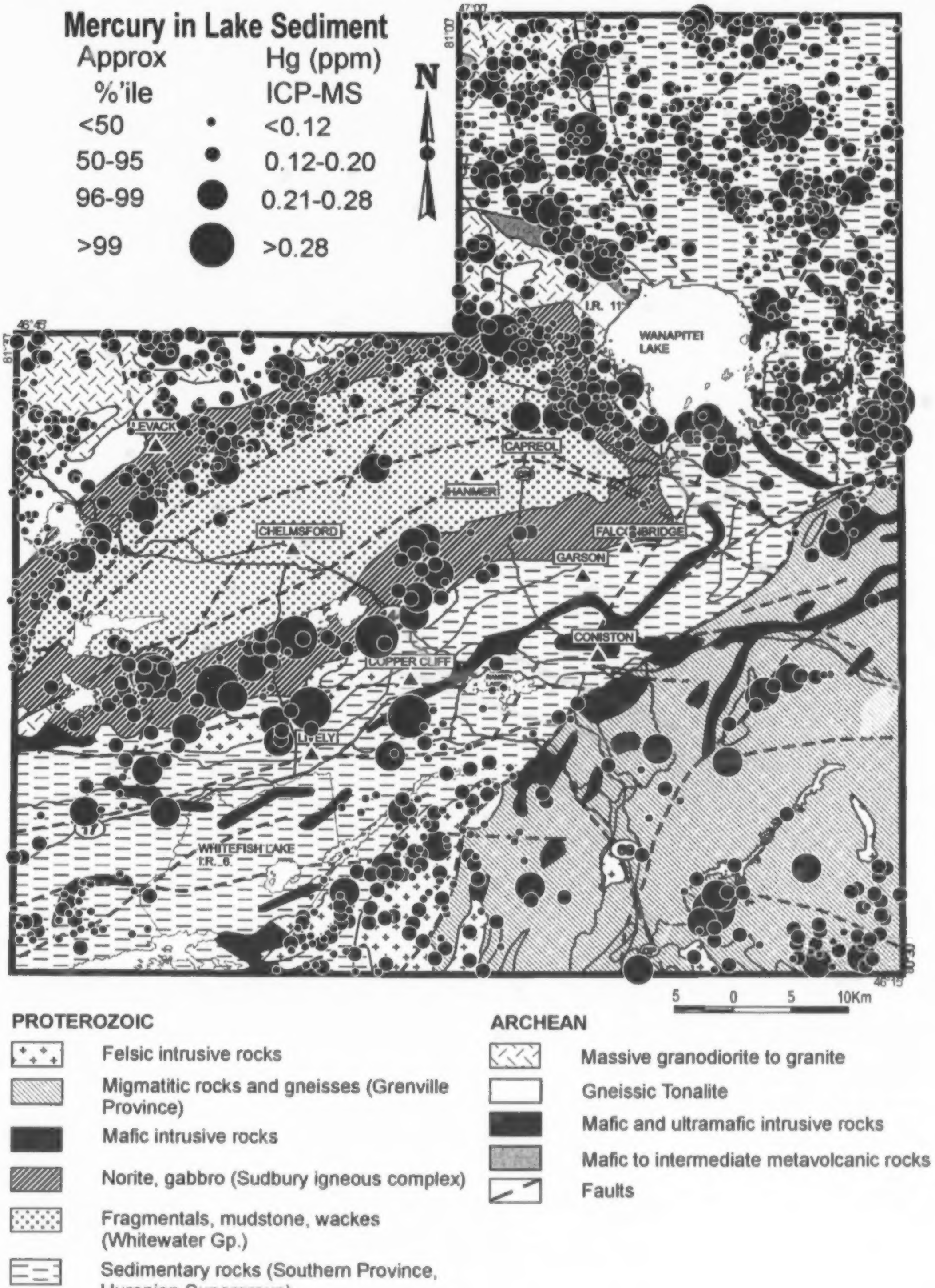


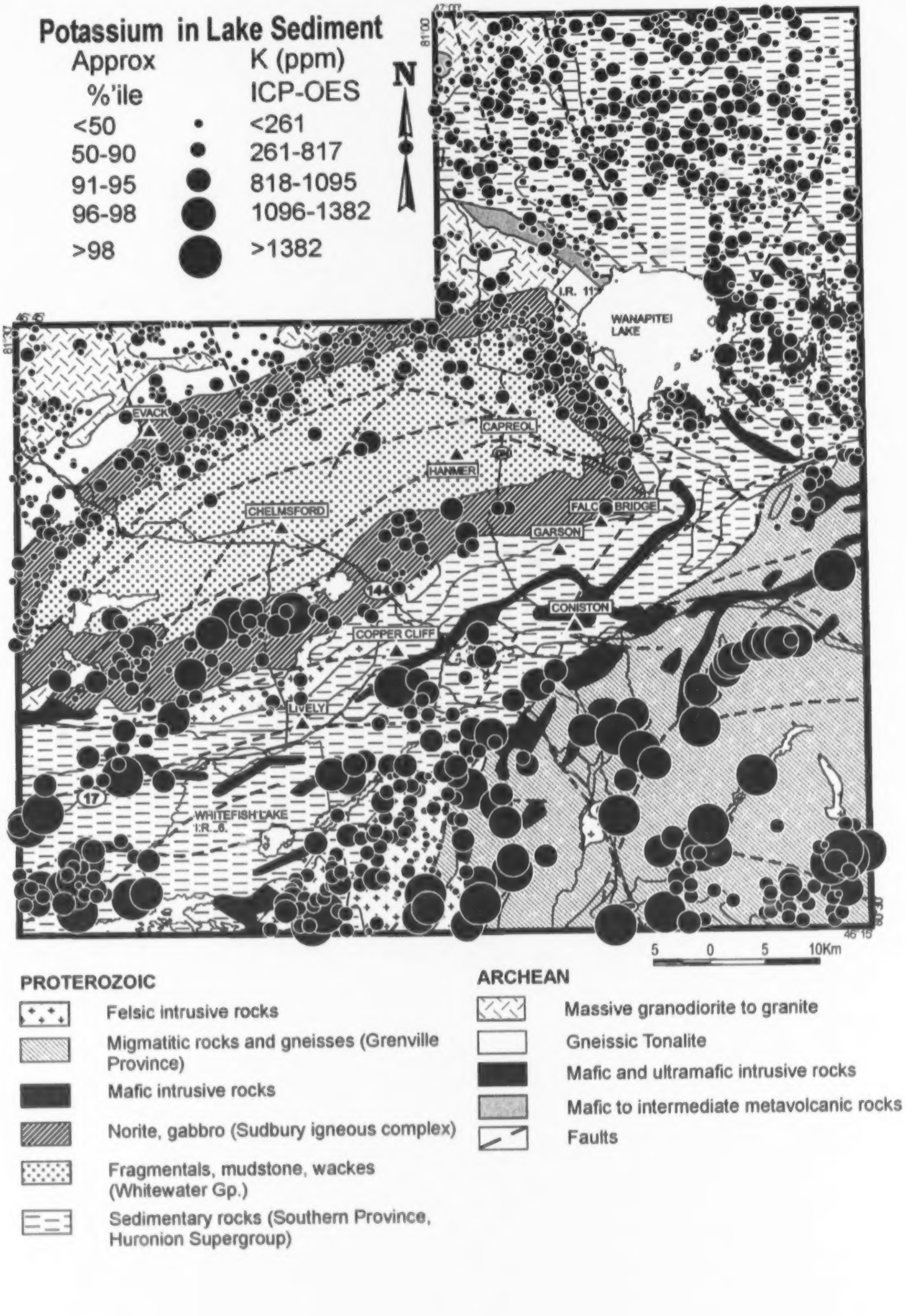
Chromium in Lake Sediment
Approx %'ile
Cr (ppm) ICP-OES
<50 • <23
50-75 • 23-35
76-90 ● 36-50
91-95 ● 51-60
96-98 ● 61-71
>98 ● >71
N
47°00'
81°07'
46°40'
81°30'
46°15'
80°30'
I.R. 11
WANAPITEI LAKE
EVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
14
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

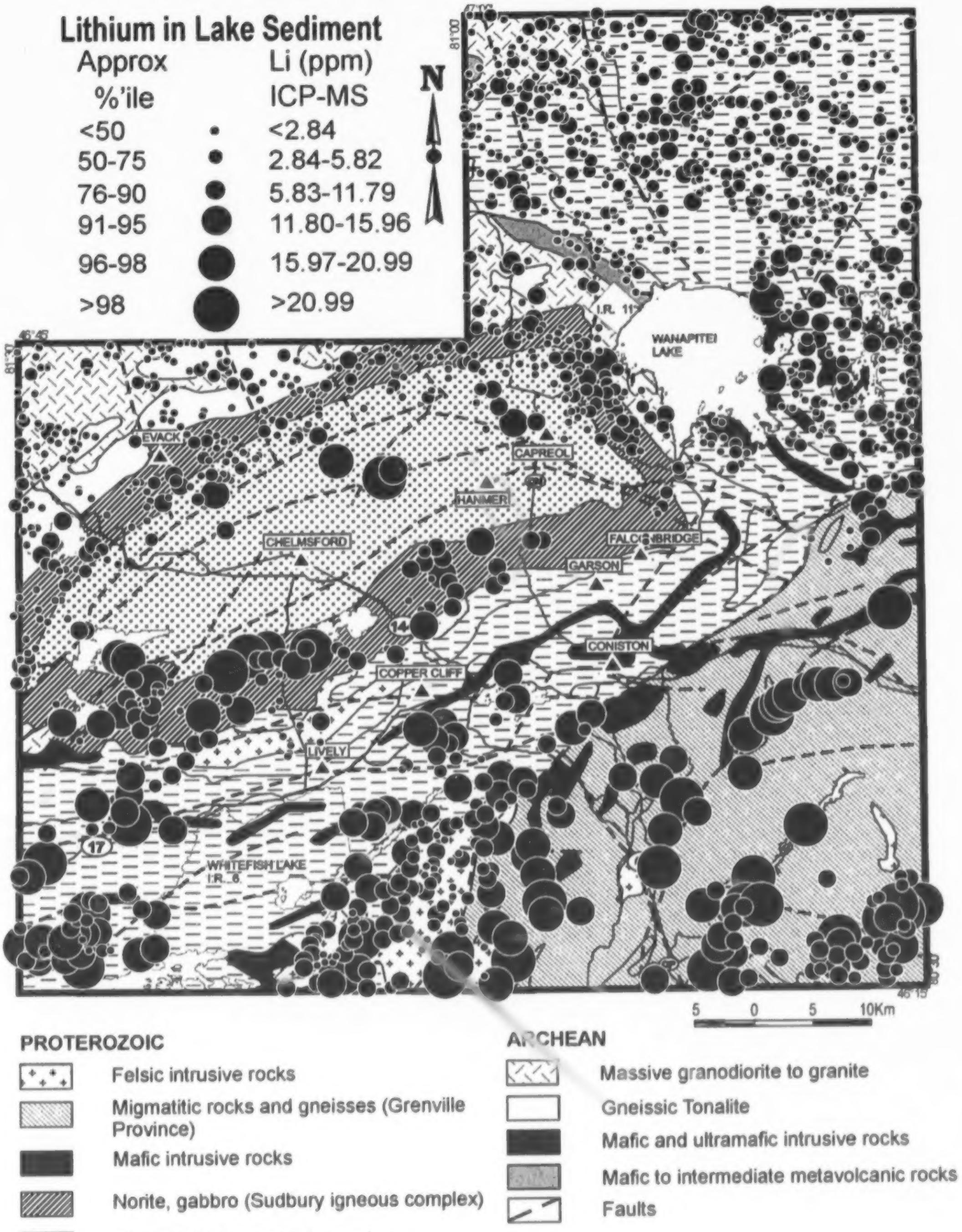

Cesium in Lake Sediment
Approx %'ile
Cs (ppm) ICP-MS
<50 <0.40
50-75 0.40-0.59
76-90 0.60-0.92
91-95 0.93-1.12
96-98 1.13-1.39
>98 >1.39
N
81°00'
46°45'
81°30'
46°15'
80°30'
WANAPITEI LAKE
I.R. 11
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
144
17
WHITEFISH LAKE I.R. "6"
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

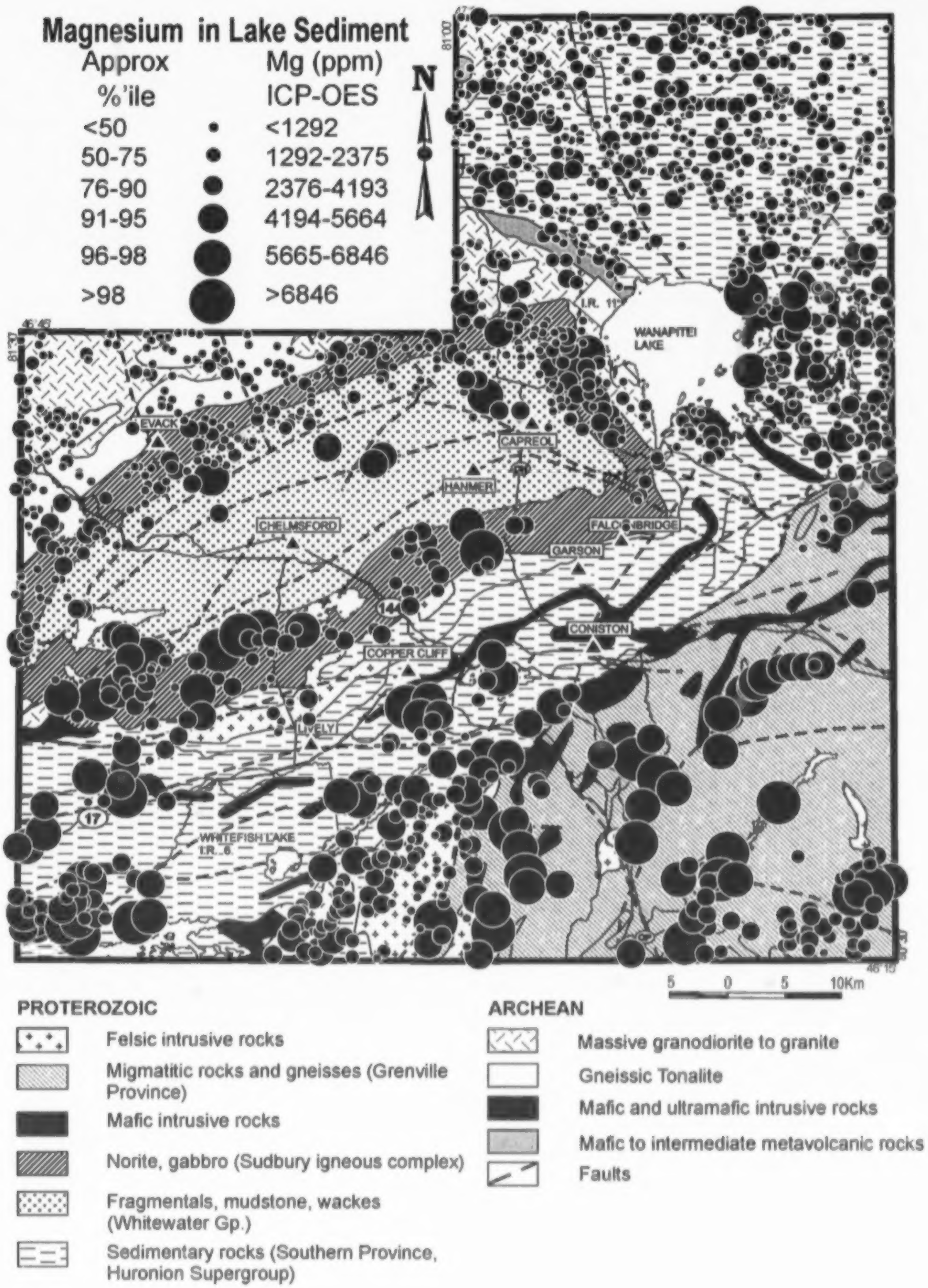
Copper in Lake Sediment
Approx %'ile
Cu (ppm) ICP-OES
<50 ● <37
50-75 ● 37-51
76-90 ● 52-75
91-95 ● 76-103
96-98 ● 104-157
>98 ● >157
N
47°00'
81°00'
46°45'
81°30'
46°15'
80°30'
WANAPITEI LAKE
I.R. 11
EVACK
CAPREOL
HANMER
CHELMSFORD
GARSON
CONISTON
LIVELY
ER CLIFF
WHITEFISH LAKE I.R. 6
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults


Iron in Lake Sediment
Approx %'ile
Fe (ppm) ICP-OES
<50 • <8556
50-75 • 8556-15037
76-90 ● 15038-22934
91-95 ● 22935-29825
96-98 ● 29826-44128
>98 ● >44128
N
47°
81°00'
46°45'
81°37'
I.R. 11
WANAPITEI LAKE
EVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
144
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
46°15'
80°30'
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults


Mercury in Lake Sediment
Approx %'ile
Hg (ppm) ICP-MS
<50 • <0.12
50-95 • 0.12-0.20
96-99 ● 0.21-0.28
>99 ● >0.28
N
47°07'
81°07'
46°45'
81°37'
80°30'
46°15'
I.R. 11
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

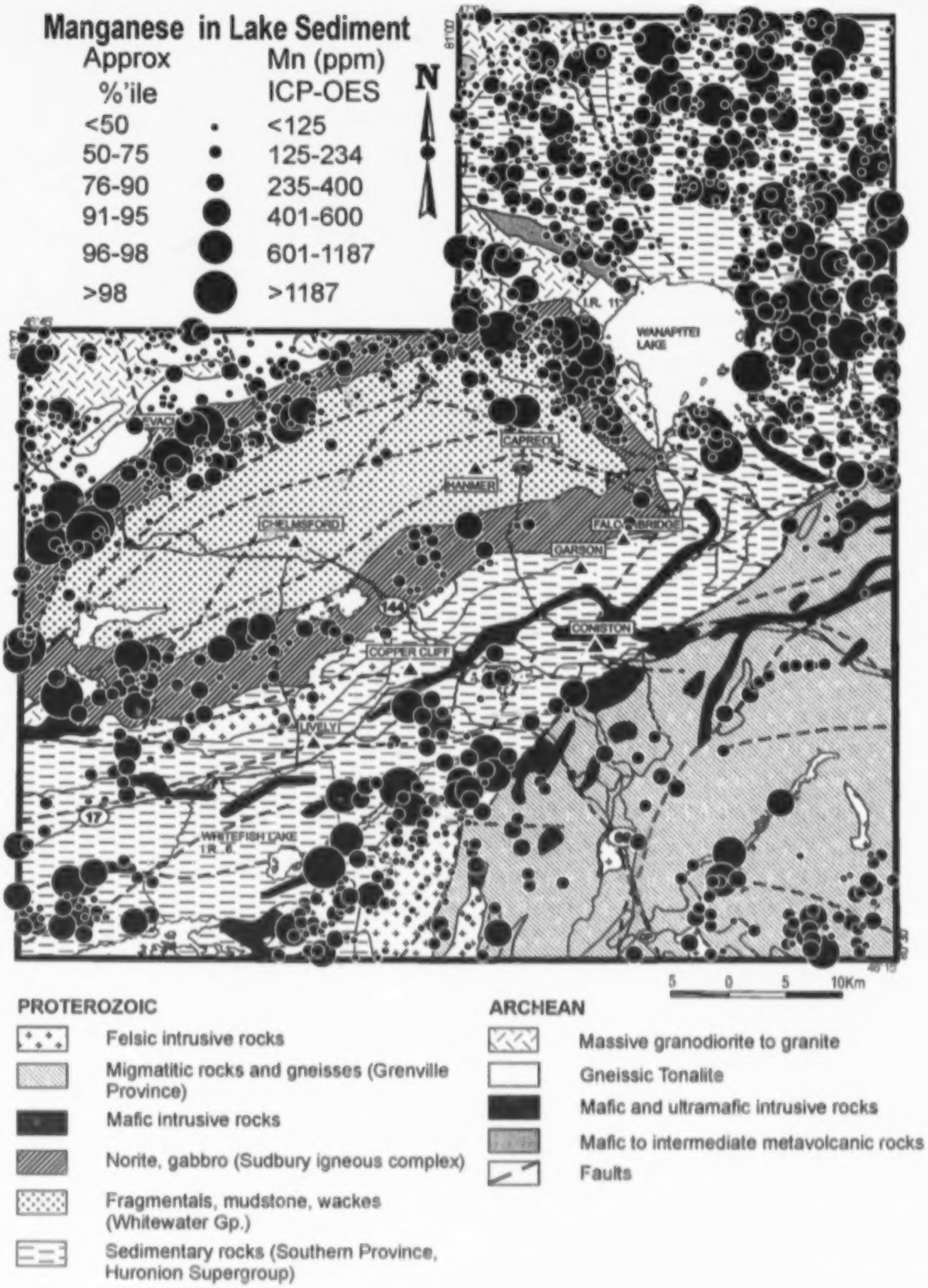

Potassium in Lake Sediment
Approx %'ile
K (ppm) ICP-OES
<50 ● <261
50-90 ● 261-817
91-95 ● 818-1095
96-98 ● 1096-1382
>98 ● >1382
N
WANAPITEI LAKE
I.R. 11
EVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
144
17
WHITEFISH LAKE I.R. 6
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

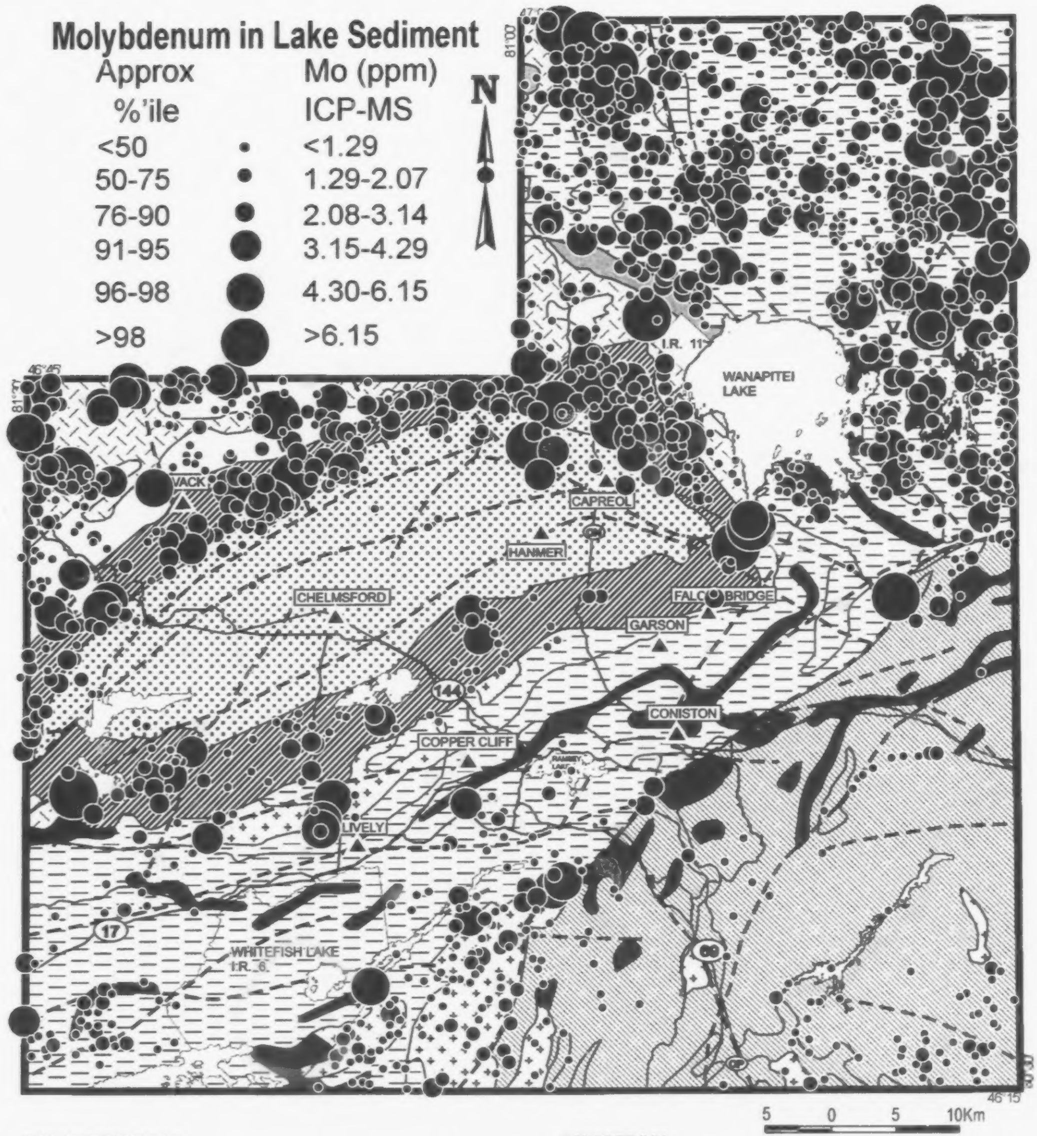
Lithium in Lake Sediment
Approx %'ile
Li (ppm) ICP-MS
<50 ● <2.84
50-75 ● 2.84-5.82
76-90 ● 5.83-11.79
91-95 ● 11.80-15.96
96-98 ● 15.97-20.99
>98 ● >20.99
N
47°00'
81°00'
46°45'
81°30'
I.R. 11
WANAPITEI LAKE
EVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
144
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
80°30'
46°15'
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults



Magnesium in Lake Sediment

Approx %'ile
Mg (ppm) ICP-OES
<50 • <1292
50-75 • 1292-2375
76-90 ● 2376-4193
91-95 ● 4194-5664
96-98 ● 5665-6846
>98 ● >6846
N
EVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
WANAPITEI LAKE
I.R. 11
144
17
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults


Manganese in Lake Sediment
Approx %'ile
Mn (ppm) ICP-OES
<50 • <125
50-75 • 125-234
76-90 ● 235-400
91-95 ● 401-600
96-98 ● 601-1187
>98 ● >1187
N
WANAPITEI LAKE
I.R. 11
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
144
17
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

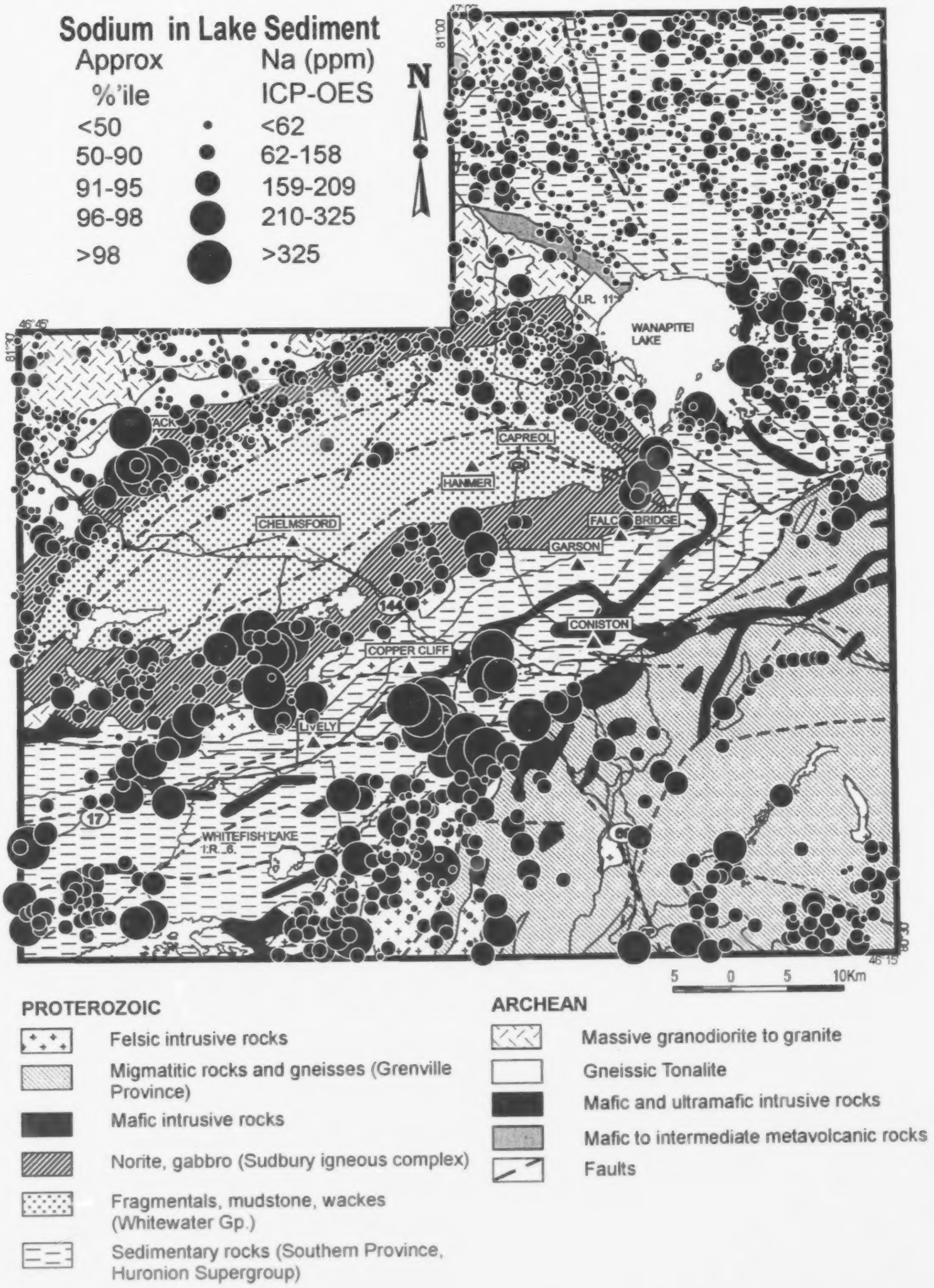

Molybdenum in Lake Sediment
Approx %'ile
Mo (ppm) ICP-MS
<50 <1.29
50-75 1.29-2.07
76-90 2.08-3.14
91-95 3.15-4.29
96-98 4.30-6.15
>98 >6.15
N
WANAPITEI LAKE
I.R. 11
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
144
17
69
5 0 5 10Km

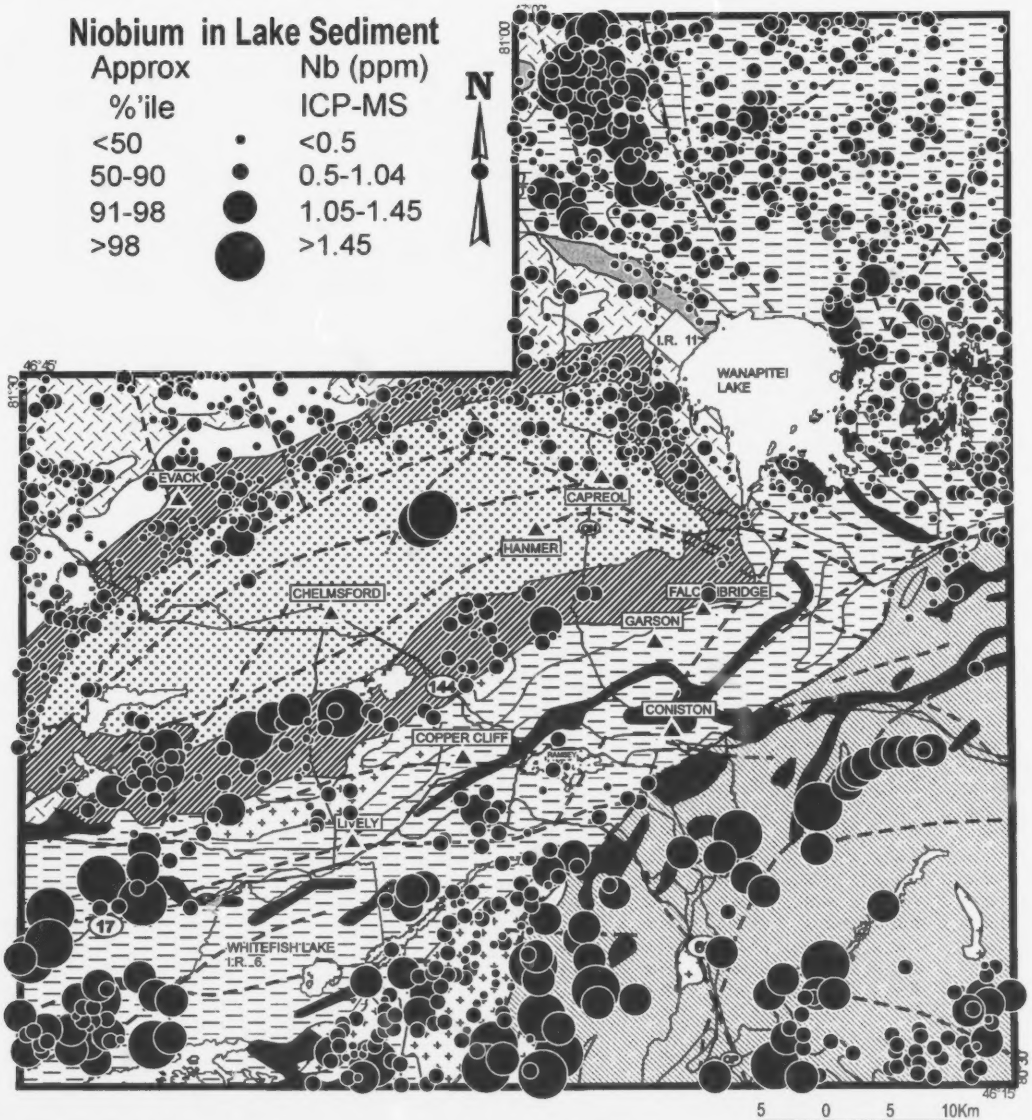
PROTEROZOIC

- ⁺₊⁺ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⁘ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

- ▨ Massive granodiorite to granite
- ☐ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▨ Mafic to intermediate metavolcanic rocks
- ⟋ Faults


Sodium in Lake Sediment
Approx %'ile
Na (ppm) ICP-OES
<50 • <62
50-90 ● 62-158
91-95 ● 159-209
96-98 ● 210-325
>98 ● >325
N
47°00'
81°00'
46°45'
81°37'
80°30'
46°15'
I.R. 11
WANAPITEI LAKE
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
144
17
WHITEFISH LAKE I.R. 6
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

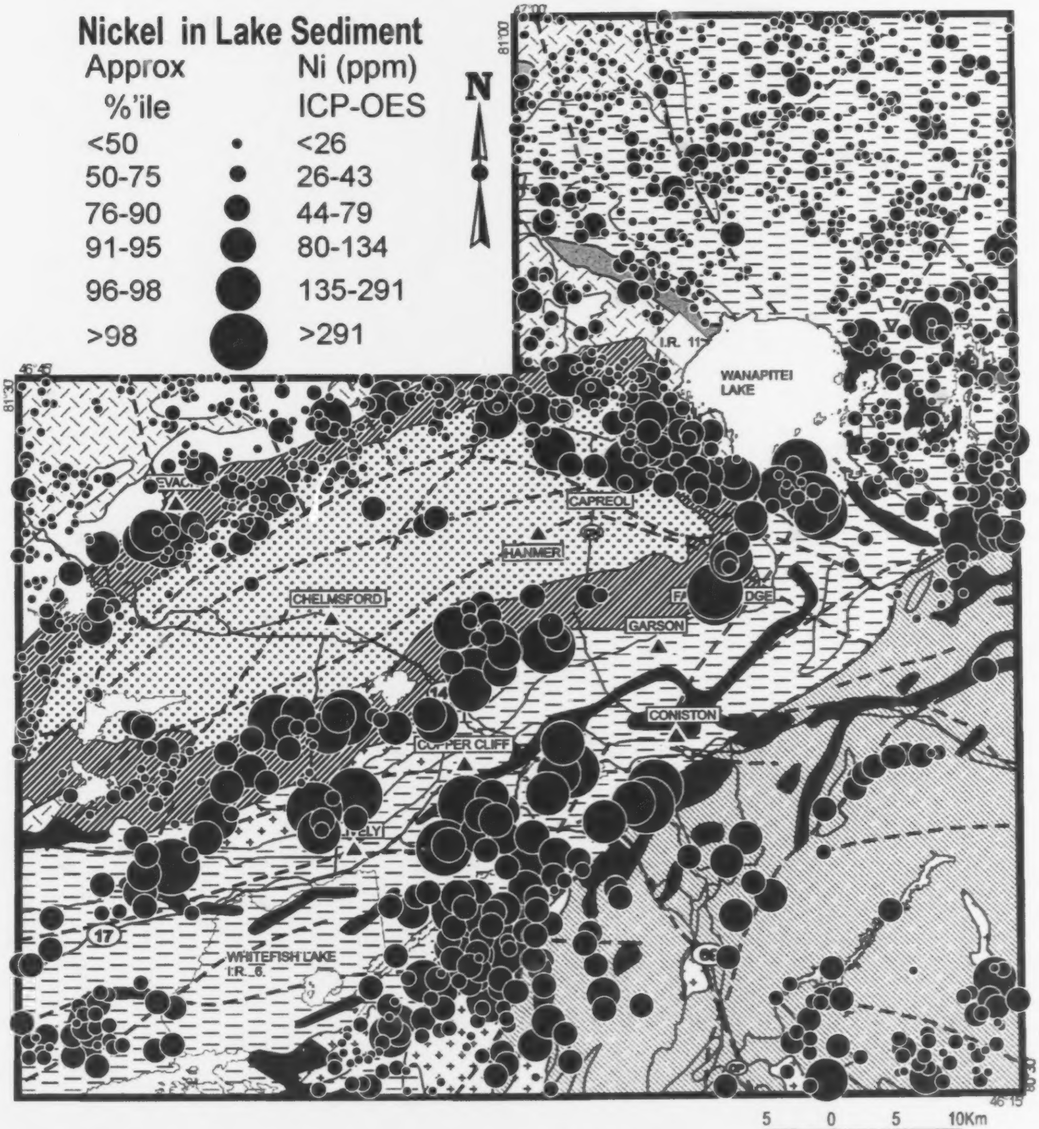

Niobium in Lake Sediment
Approx %'ile
Nb (ppm) ICP-MS
<50 <0.5
50-90 0.5-1.04
91-98 1.05-1.45
>98 >1.45
N
81°00'
81°37'
46°45'
46°15'
80°30'
WANAPITEI LAKE
I.R. 11
EVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
144
17
5 0 5 10Km

PROTEROZOIC

- ⁺ Felsic intrusive rocks
- ░ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⁙ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ▤ Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

- ▧ Massive granodiorite to granite
- ☐ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▒ Mafic to intermediate metavolcanic rocks
- ⟋ Faults

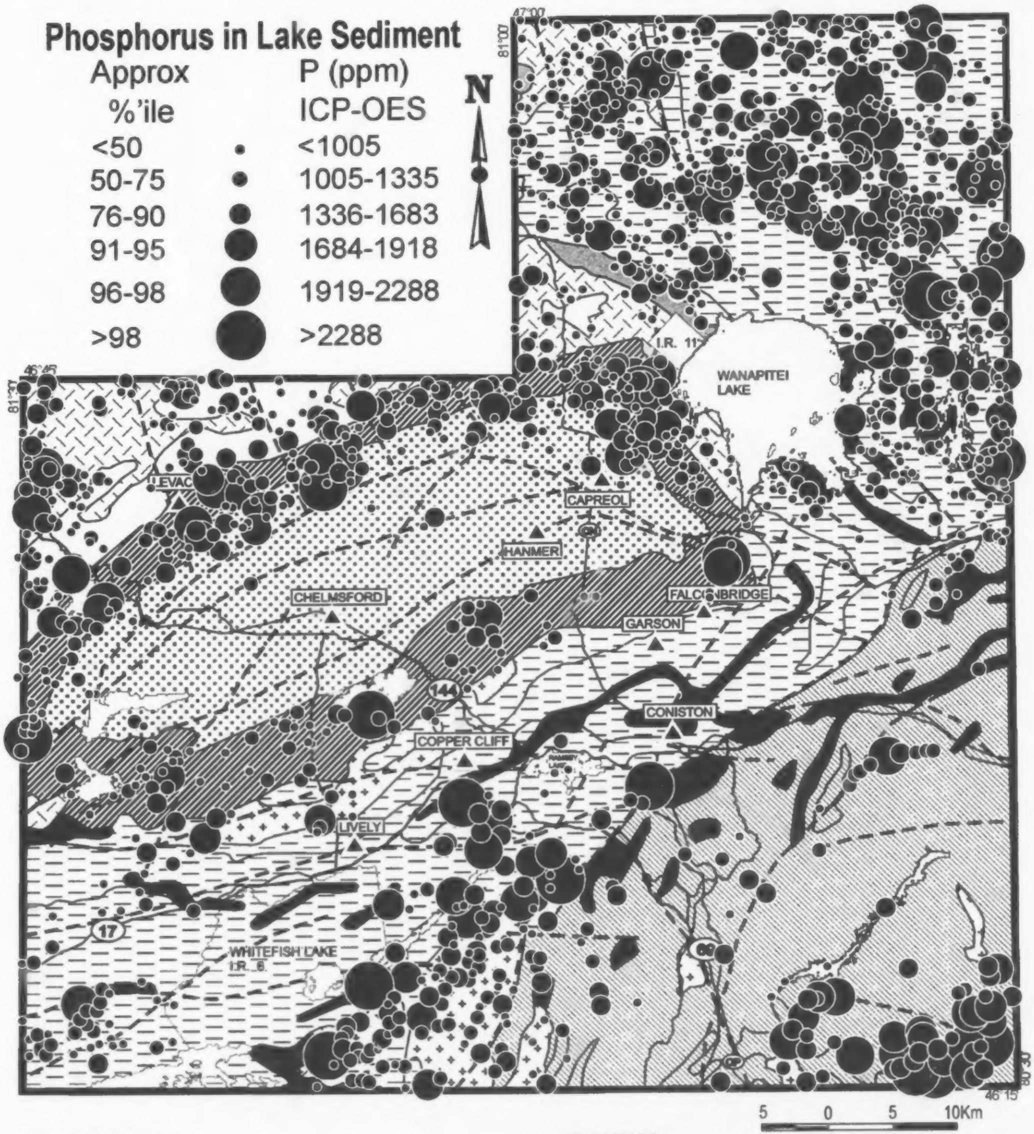

Nickel in Lake Sediment
Approx %'ile
Ni (ppm) ICP-OES
<50 <26
50-75 26-43
76-90 44-79
91-95 80-134
96-98 135-291
>98 >291
N
47°00'
81°00'
46°45'
81°30'
46°15'
80°30'
I.R. 11
WANAPITEI LAKE
CAPREOL
HANMER
CHELMSFORD
GARSON
CONISTON
COPPER CLIFF
ELY
WHITEFISH LAKE I.R. 6
17
144
69
5 0 5 10Km

PROTEROZOIC

- ⁺⁺ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⁚⁚ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

- ▨ Massive granodiorite to granite
- □ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▒ Mafic to intermediate metavolcanic rocks
- ⁄ Faults

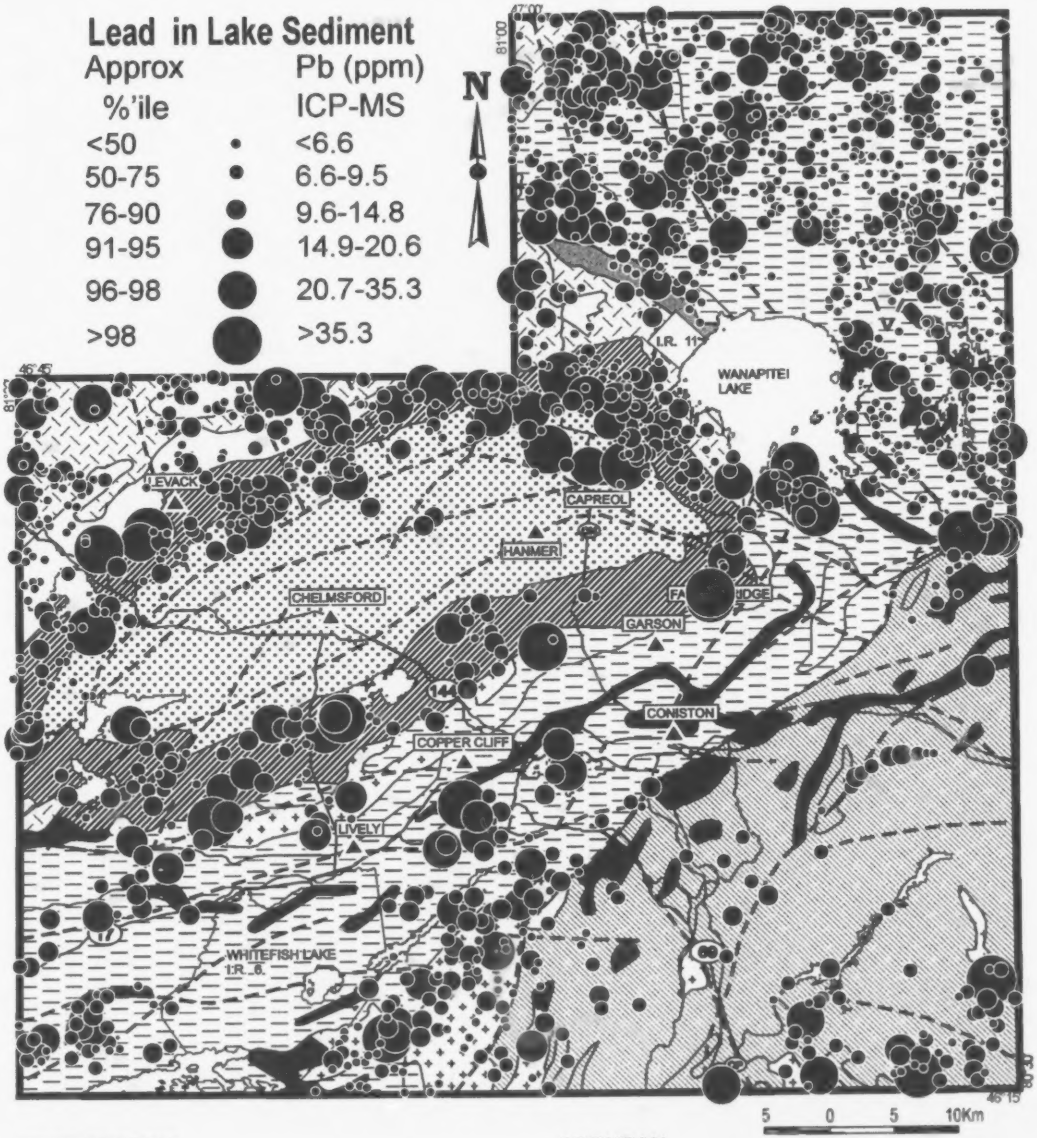

Phosphorus in Lake Sediment
Approx %'ile
P (ppm) ICP-OES
<50 ● <1005
50-75 ● 1005-1335
76-90 ● 1336-1683
91-95 ● 1684-1918
96-98 ● 1919-2288
>98 ● >2288
N
47°00
81°00
46°45
81°37
LEVAC
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
I.R. 11
WANAPITEI LAKE
WHITEFISH LAKE I.R. 6
144
17
69
46°15
80°30
5 0 5 10Km

PROTEROZOIC

- ⁺ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⁚ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

- ▨ Massive granodiorite to granite
- ☐ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▒ Mafic to intermediate metavolcanic rocks
- ⁄ Faults

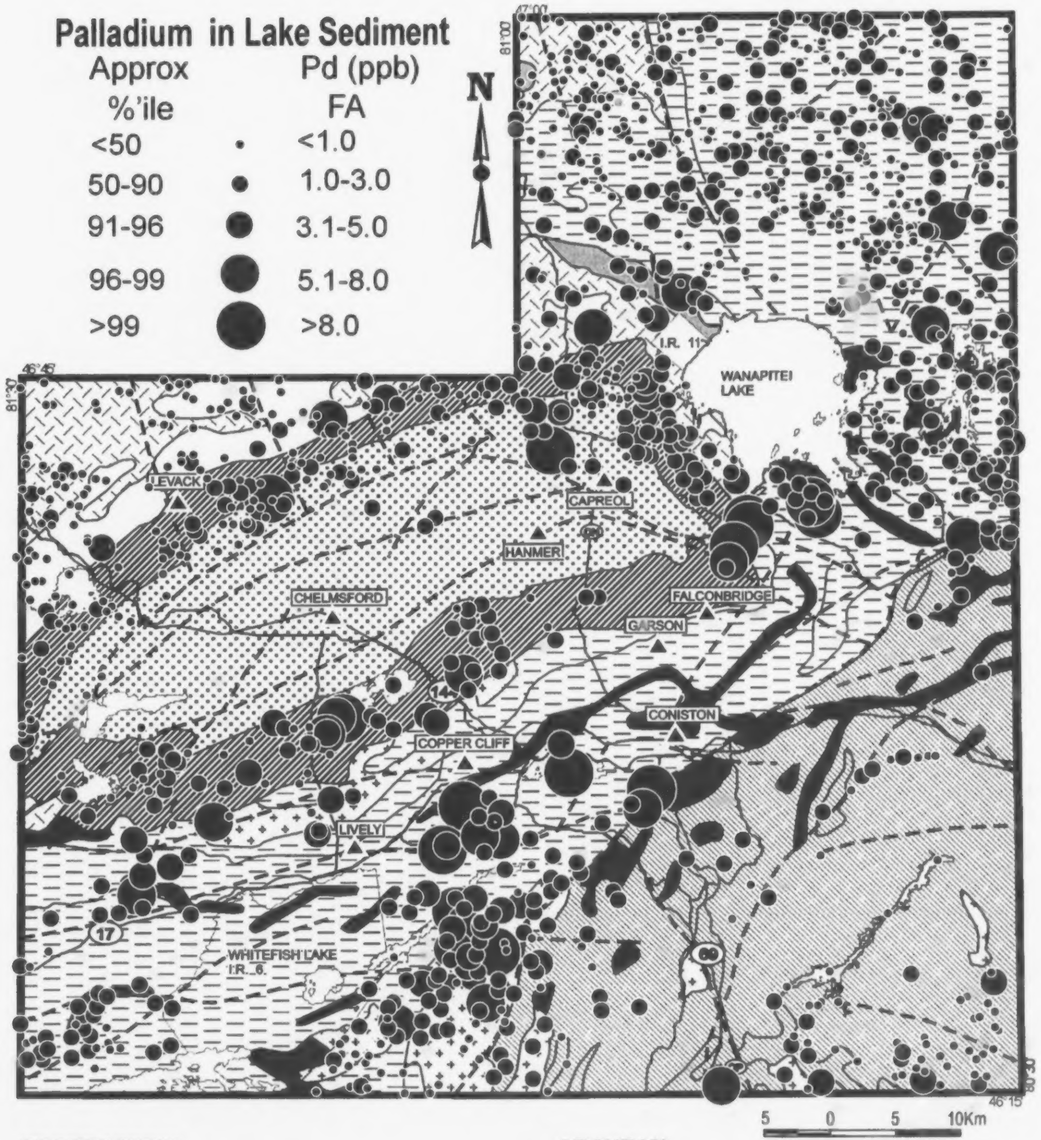

Lead in Lake Sediment
Approx %'ile
Pb (ppm) ICP-MS
<50 ● <6.6
50-75 ● 6.6-9.5
76-90 ● 9.6-14.8
91-95 ● 14.9-20.6
96-98 ● 20.7-35.3
>98 ● >35.3
N
47°00'
81°00'
46°45'
46°15'
WANAPITEI LAKE
I.R. 11
LEVACK
CAPREOL
HANMER
CHELMSFORD
FA IDGE
GARSON
144
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
69
5 0 5 10Km

PROTEROZOIC

- ✢ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⠿ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

- ▨ Massive granodiorite to granite
- ☐ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▩ Mafic to intermediate metavolcanic rocks
- ⟋ Faults

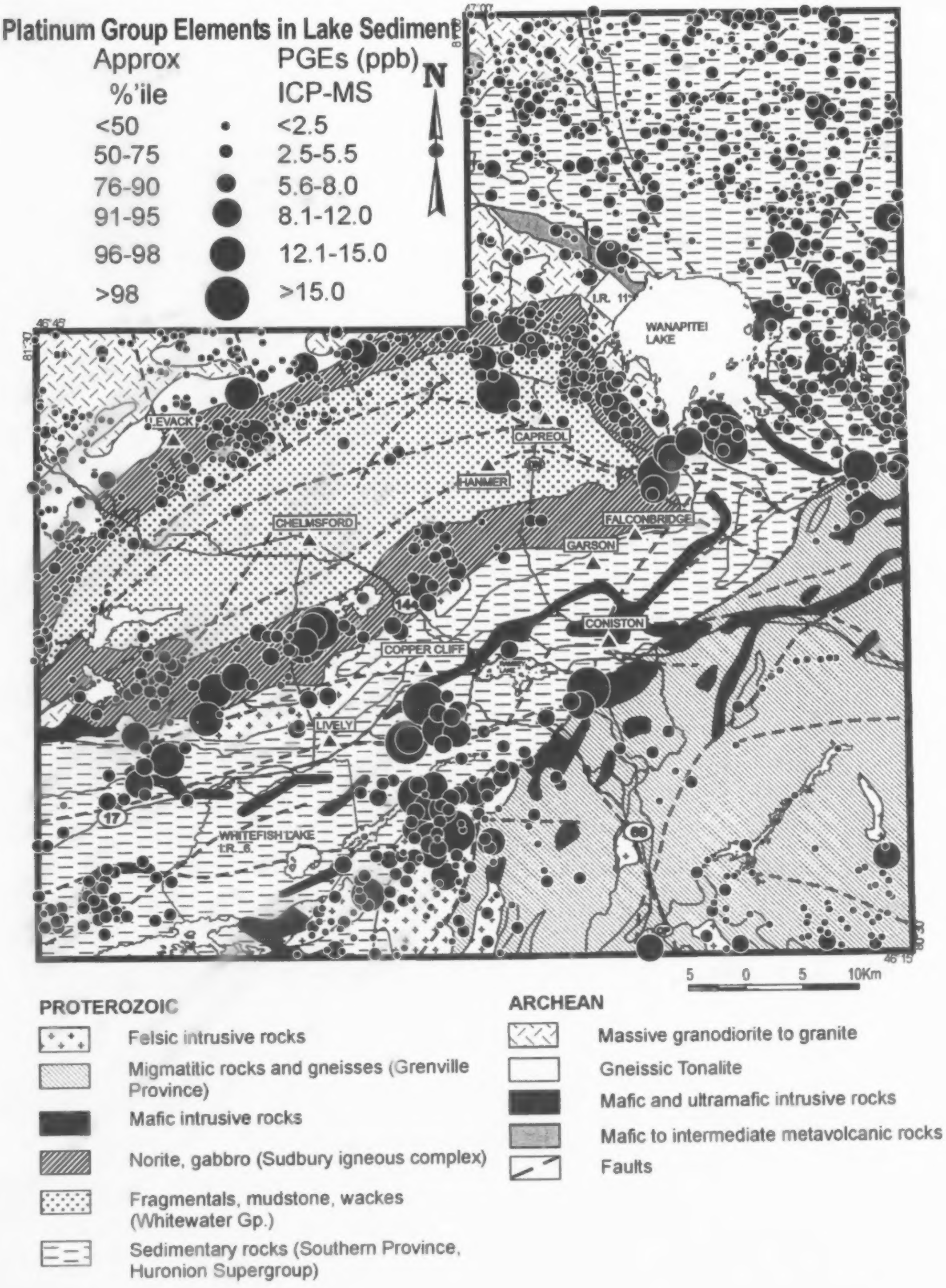

Palladium in Lake Sediment
Approx %'ile
Pd (ppb) FA
<50 • <1.0
50-90 ● 1.0-3.0
91-96 ● 3.1-5.0
96-99 ● 5.1-8.0
>99 ● >8.0
N
47°00'
81°00'
46°45'
81°30'
46°15'
80°30'
I.R. 11
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
144
17
69
5 0 5 10Km

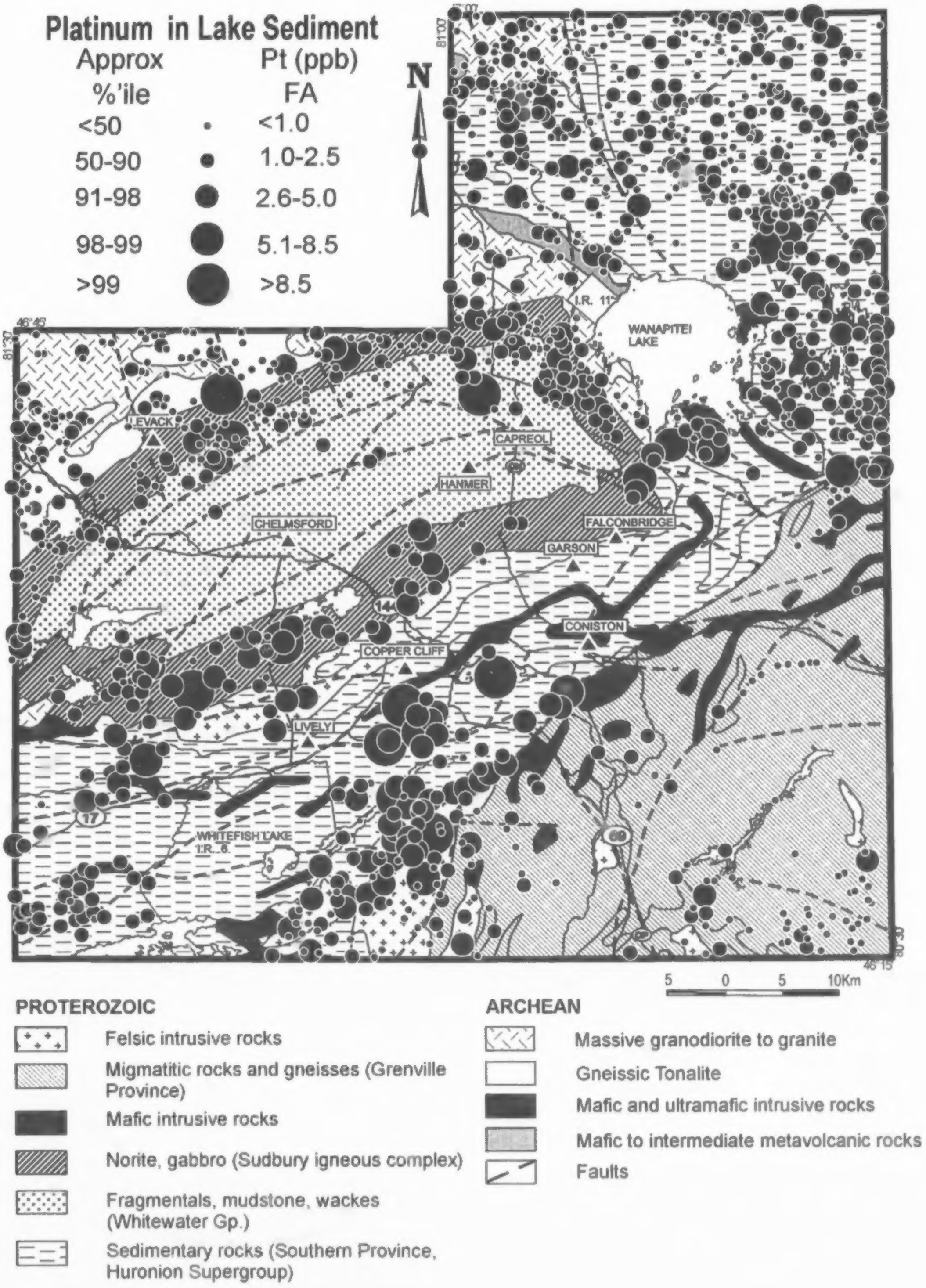
PROTEROZOIC

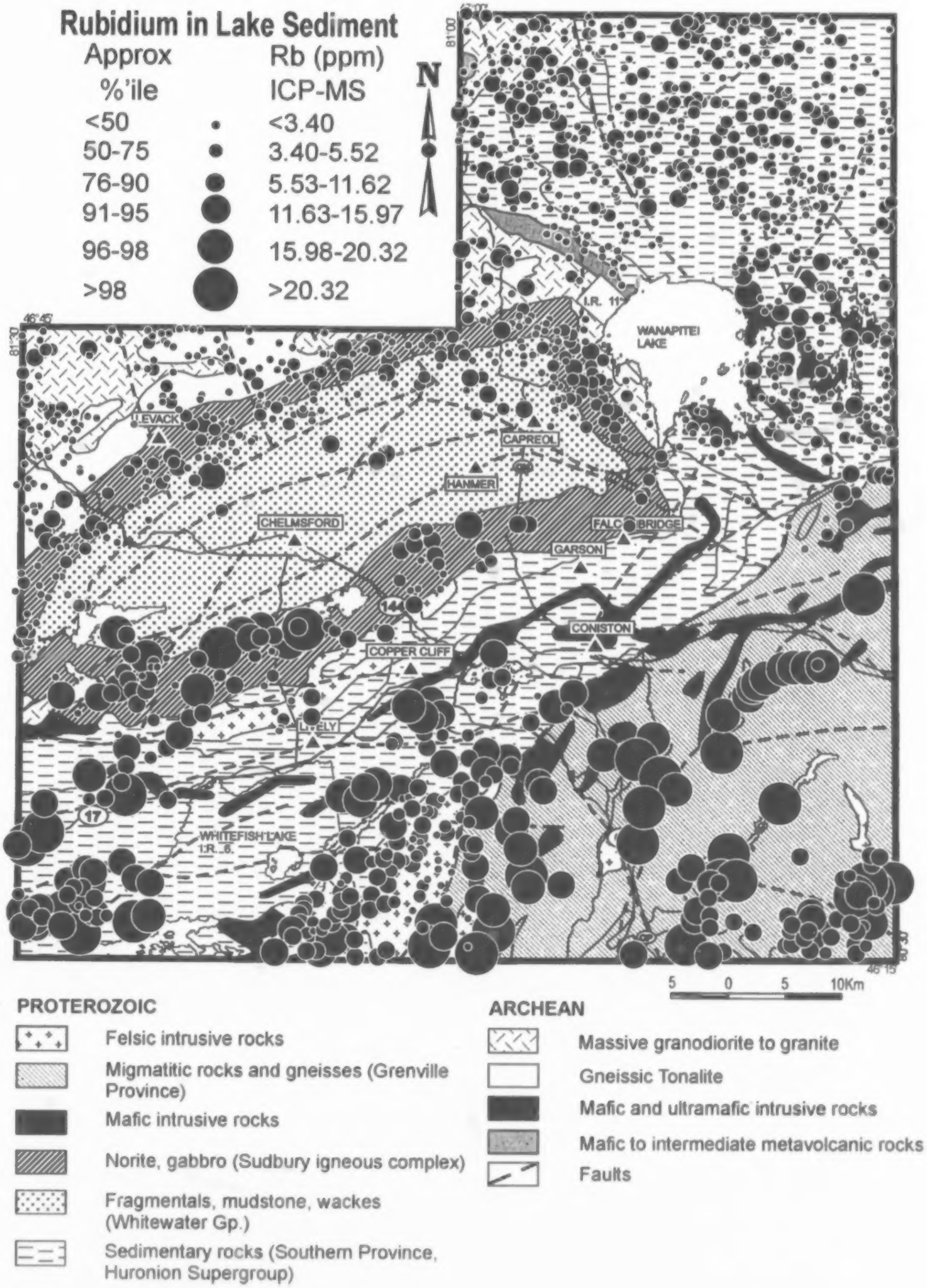
- ⁺ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⁚ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

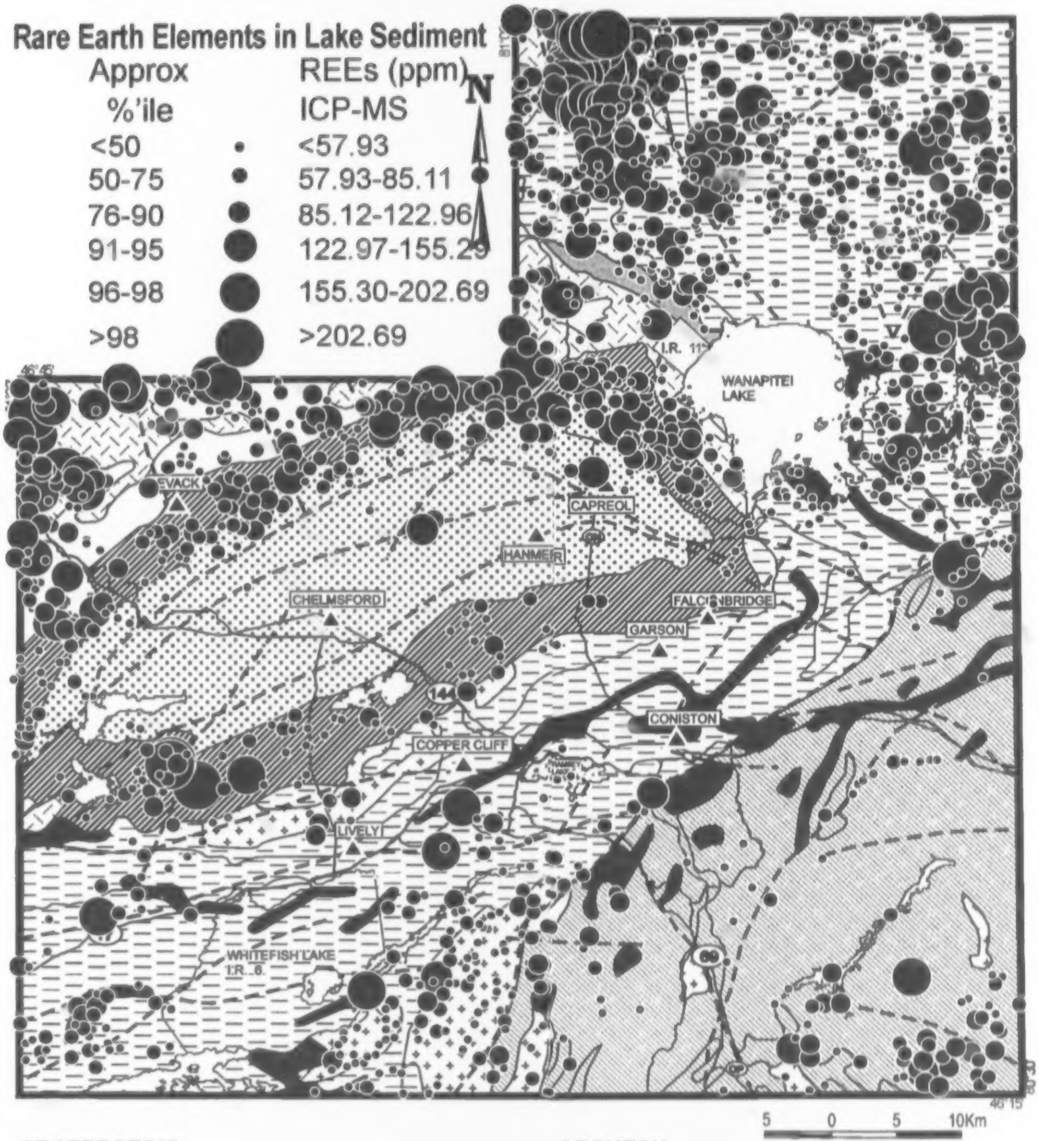
ARCHEAN

- ▨ Massive granodiorite to granite
- □ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▒ Mafic to intermediate metavolcanic rocks
- ⁄ Faults


Platinum Group Elements in Lake Sediment
Approx %'ile
PGEs (ppb) ICP-MS
<50 ● <2.5
50-75 ● 2.5-5.5
76-90 ● 5.6-8.0
91-95 ● 8.1-12.0
96-98 ● 12.1-15.0
>98 ● >15.0
N
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
I.R. 11
144
17
69
47°00'
46°45'
46°15'
81°30'
80°30'
5
0
5
10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults


Platinum in Lake Sediment
Approx %'ile
Pt (ppb) FA
<50 • <1.0
50-90 ● 1.0-2.5
91-98 ● 2.6-5.0
98-99 ● 5.1-8.5
>99 ● >8.5
N
81°07'
46°45'
81°37'
80°30'
46°15'
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
WANAPITEI LAKE
I.R. 11
144
17
69
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults


Rubidium in Lake Sediment
Approx
%'ile
Rb (ppm)
ICP-MS
<50 • <3.40
50-75 • 3.40-5.52
76-90 ● 5.53-11.62
91-95 ● 11.63-15.97
96-98 ● 15.98-20.32
>98 ● >20.32
N
81°00
46°45
81°30
46°15
80°30
I.R. 11
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
144
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

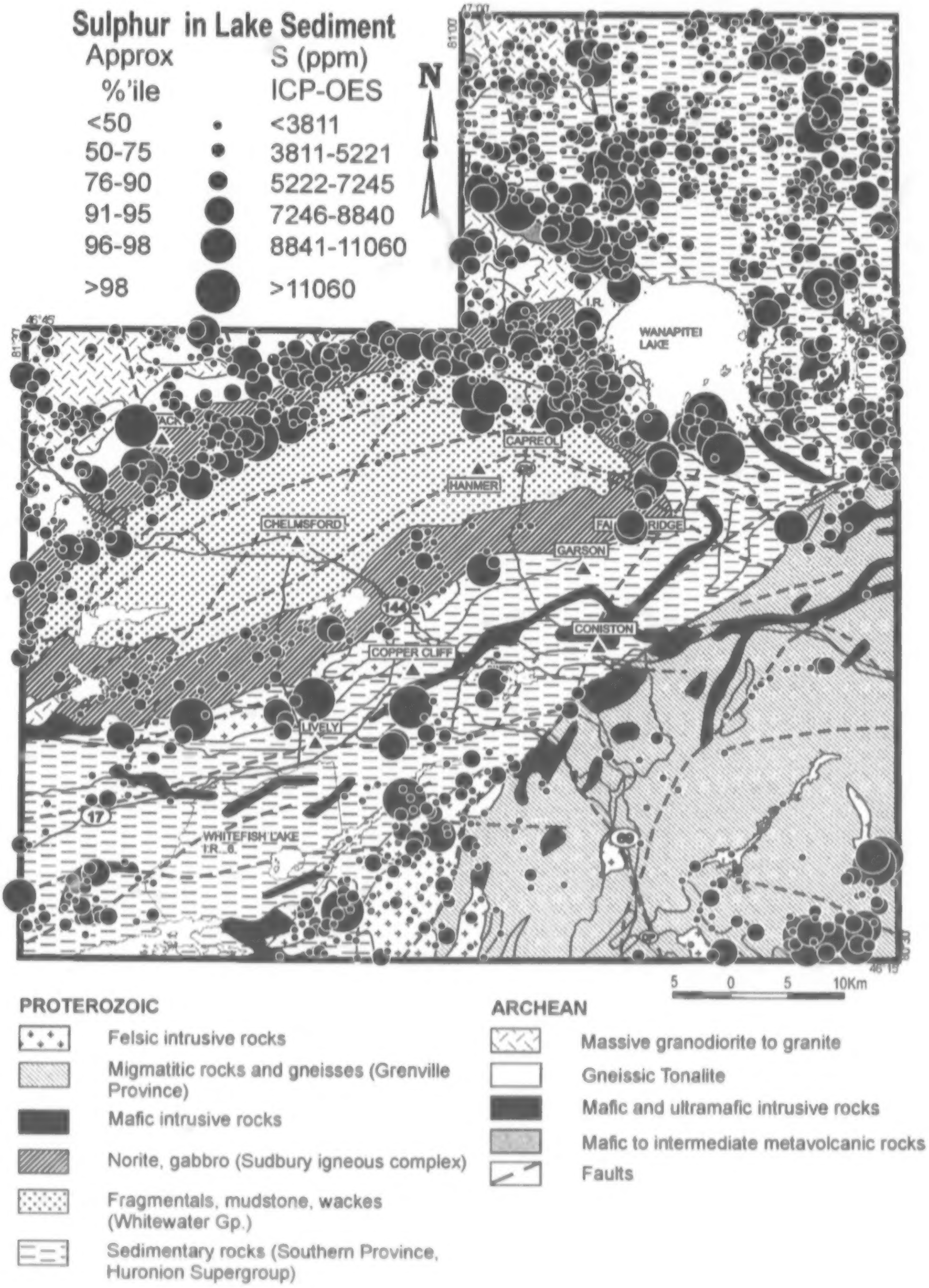

Rare Earth Elements in Lake Sediment
Approx %'ile
REEs (ppm) ICP-MS
<50 • <57.93
50-75 • 57.93-85.11
76-90 ● 85.12-122.96
91-95 ● 122.97-155.29
96-98 ● 155.30-202.69
>98 ● >202.69
N
I.R. 11
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
144
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
46°15
5 0 5 10Km

PROTEROZOIC

- ⁺ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⁘ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

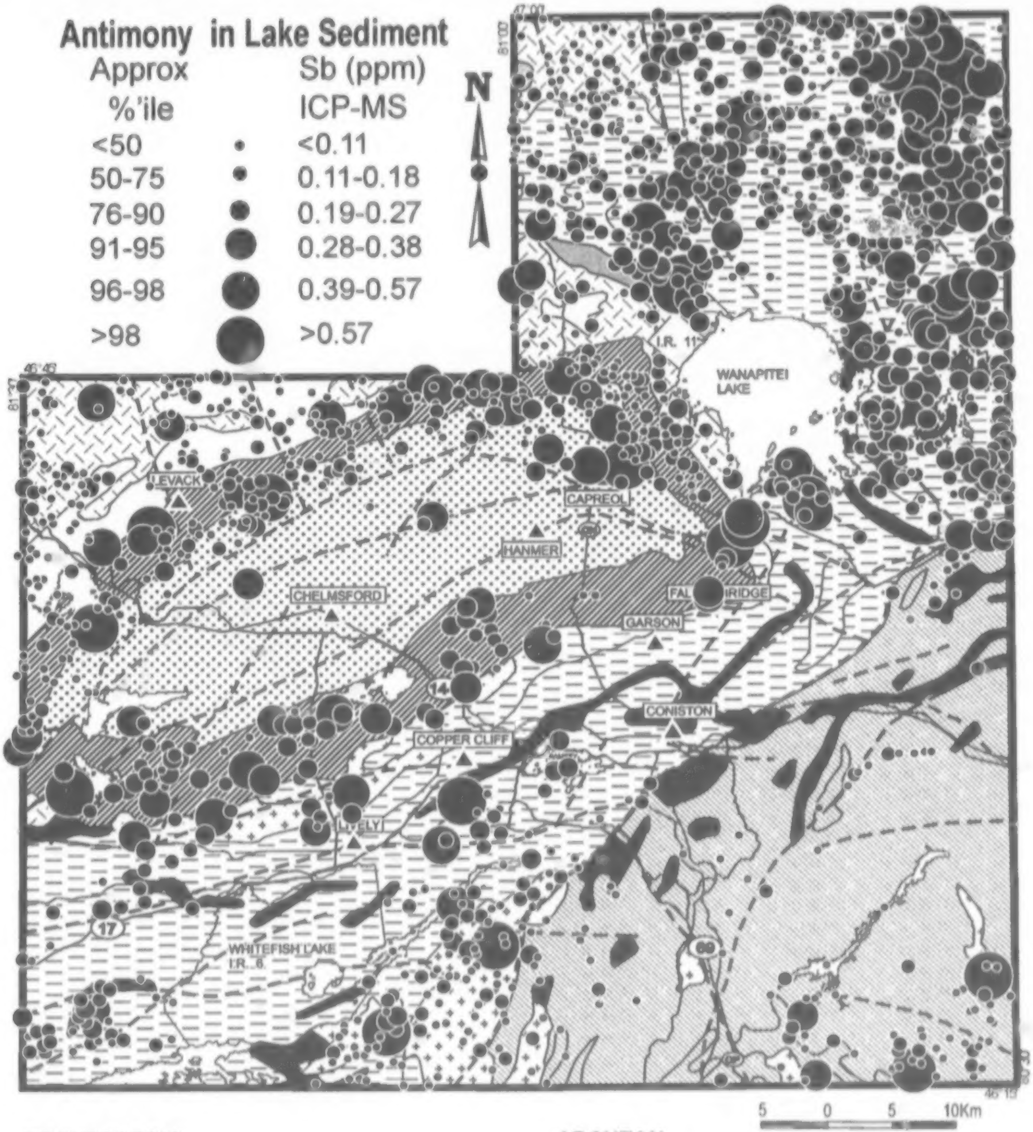
ARCHEAN

- ▨ Massive granodiorite to granite
- ☐ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▨ Mafic to intermediate metavolcanic rocks
- ⟋ Faults



Sulphur in Lake Sediment

Approx %'ile
S (ppm) ICP-OES
<50 • <3811
50-75 • 3811-5221
76-90 ● 5222-7245
91-95 ● 7246-8840
96-98 ● 8841-11060
>98 ● >11060
N
47°00'
81°00'
46°45'
81°37'
80°30'
46°15'
WANAPITEI LAKE
I.R.
CAPREOL
HANMER
CHELMSFORD
GARSON
FALCONBRIDGE
CONISTON
COPPER CLIFF
LIVELY
144
17
69
WHITEFISH LAKE I.R. 6
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

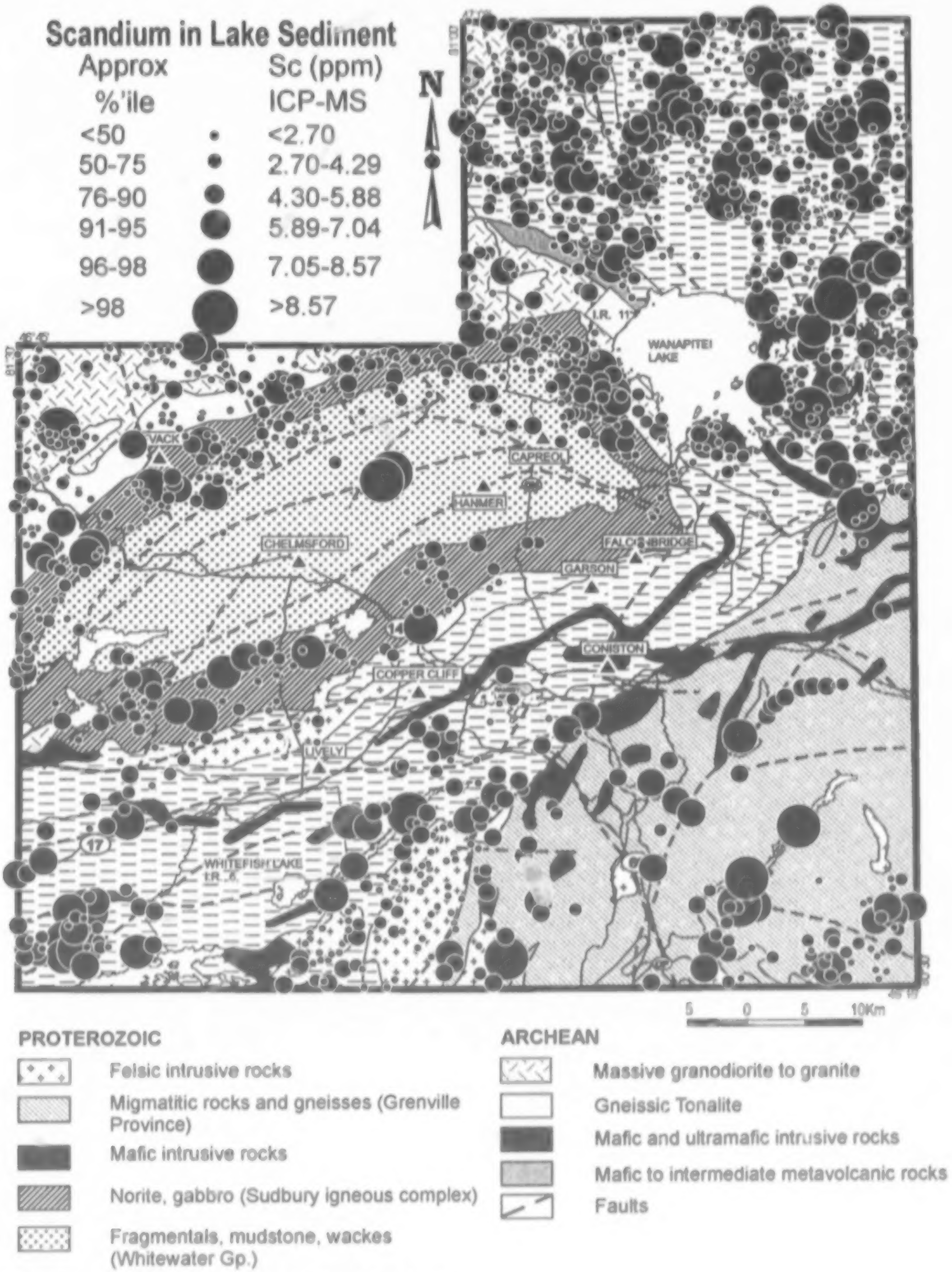

Antimony in Lake Sediment
Approx %'ile
Sb (ppm) ICP-MS
<50 <0.11
50-75 0.11-0.18
76-90 0.19-0.27
91-95 0.28-0.38
96-98 0.39-0.57
>98 >0.57
N
47°00'
81°07'
46°45'
81°37'
46°15'
80°30'
I.R. 11
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
17
144
69
5 0 5 10Km

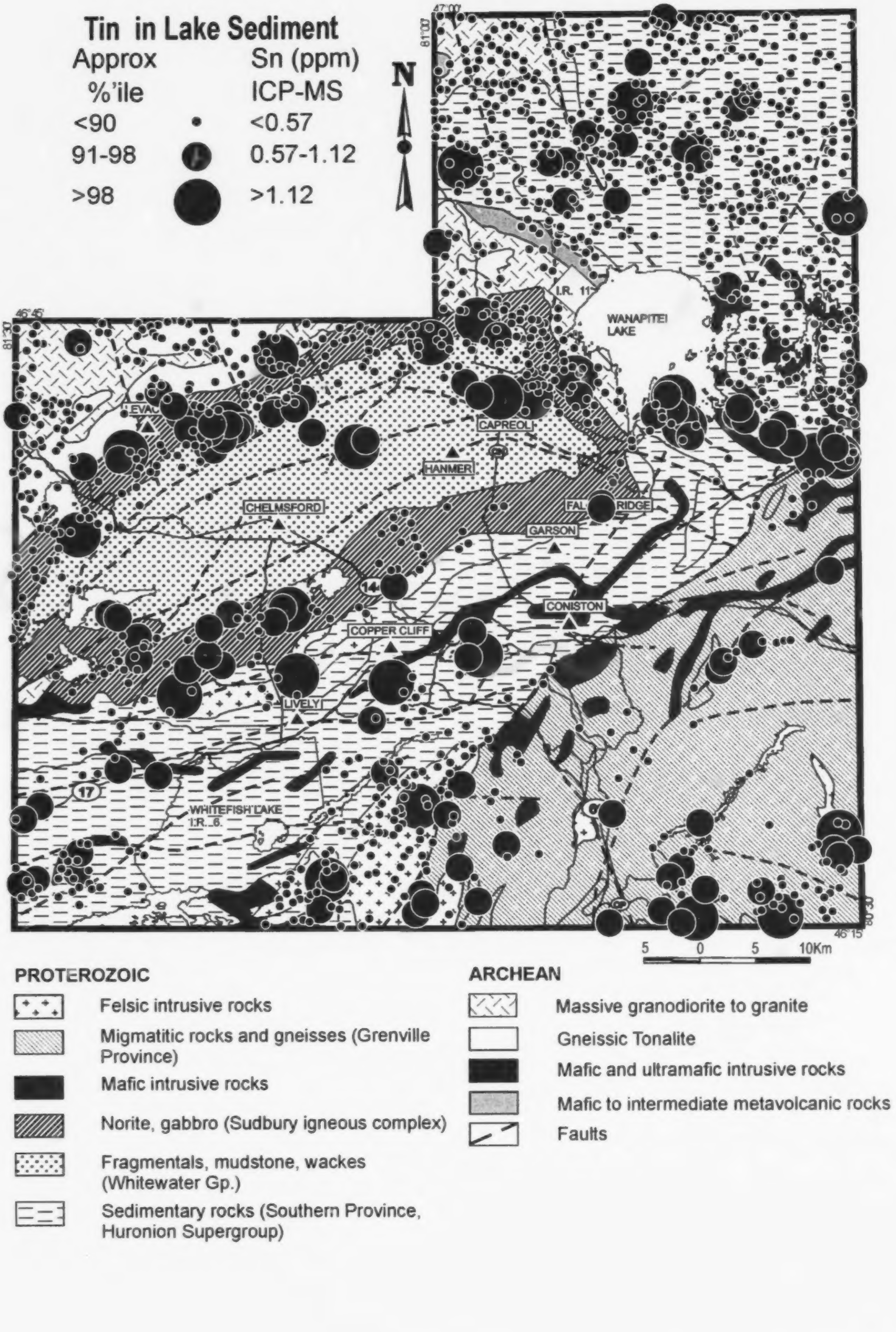
PROTEROZOIC

- ✢ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⁘ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

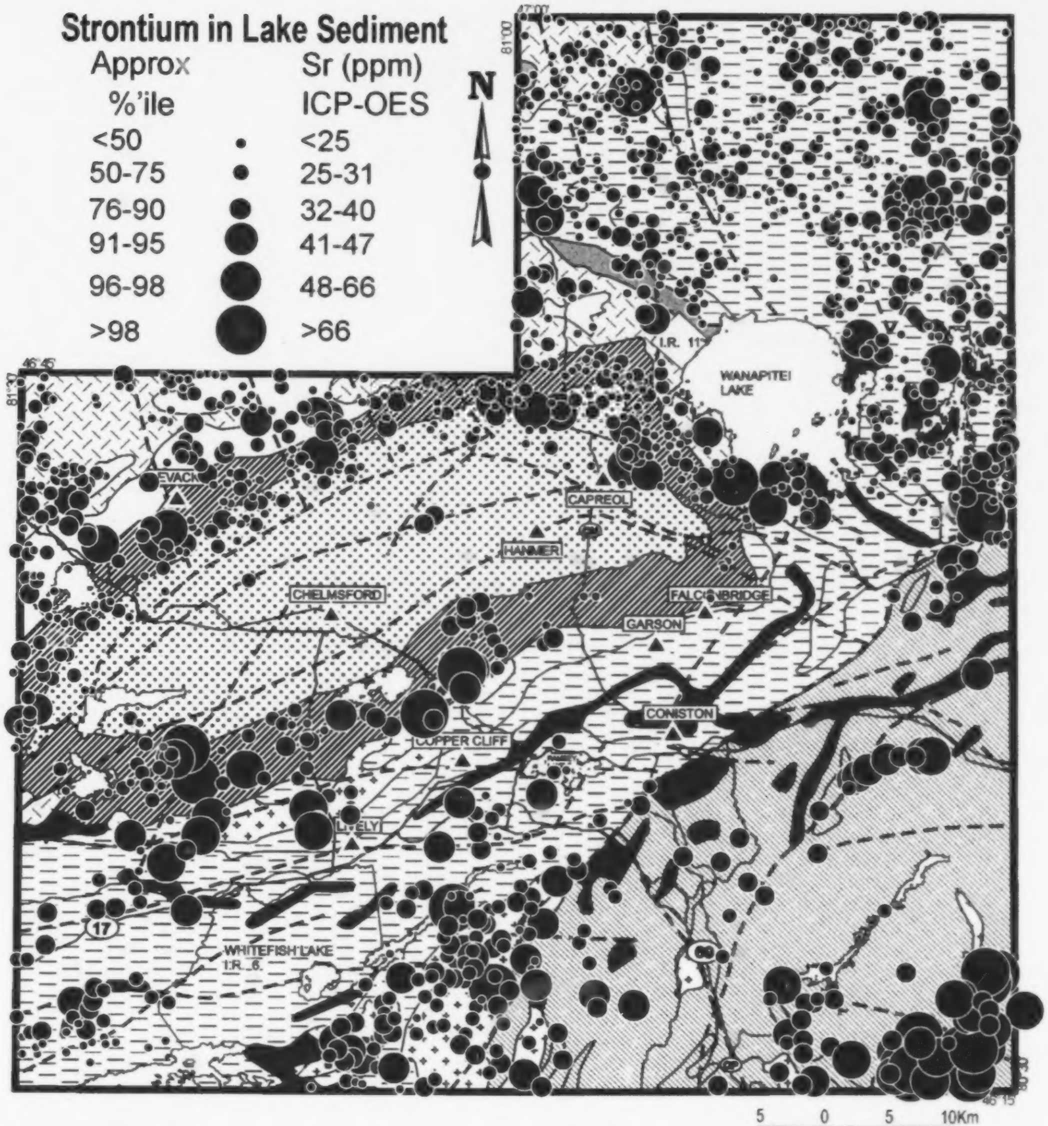
ARCHEAN

- ▨ Massive granodiorite to granite
- ☐ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▨ Mafic to intermediate metavolcanic rocks
- ⟋ Faults


Scandium in Lake Sediment
Approx %'ile
Sc (ppm) ICP-MS
<50 <2.70
50-75 2.70-4.29
76-90 4.30-5.88
91-95 5.89-7.04
96-98 7.05-8.57
>98 >8.57
N
WANAPITEI LAKE
I.R. 11
VACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
144
17
WHITEFISH LAKE I.R. 6
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults



Tin in Lake Sediment
Approx %'ile
Sn (ppm) ICP-MS
<90 • <0.57
91-98 ● 0.57-1.12
>98 ● >1.12
N
47°00'
81°00'
46°45'
81°37'
46°15'
80°30'
WANAPITEI LAKE
I.R. 11
EVAN
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
144
17
WHITEFISH LAKE I.R. 6
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

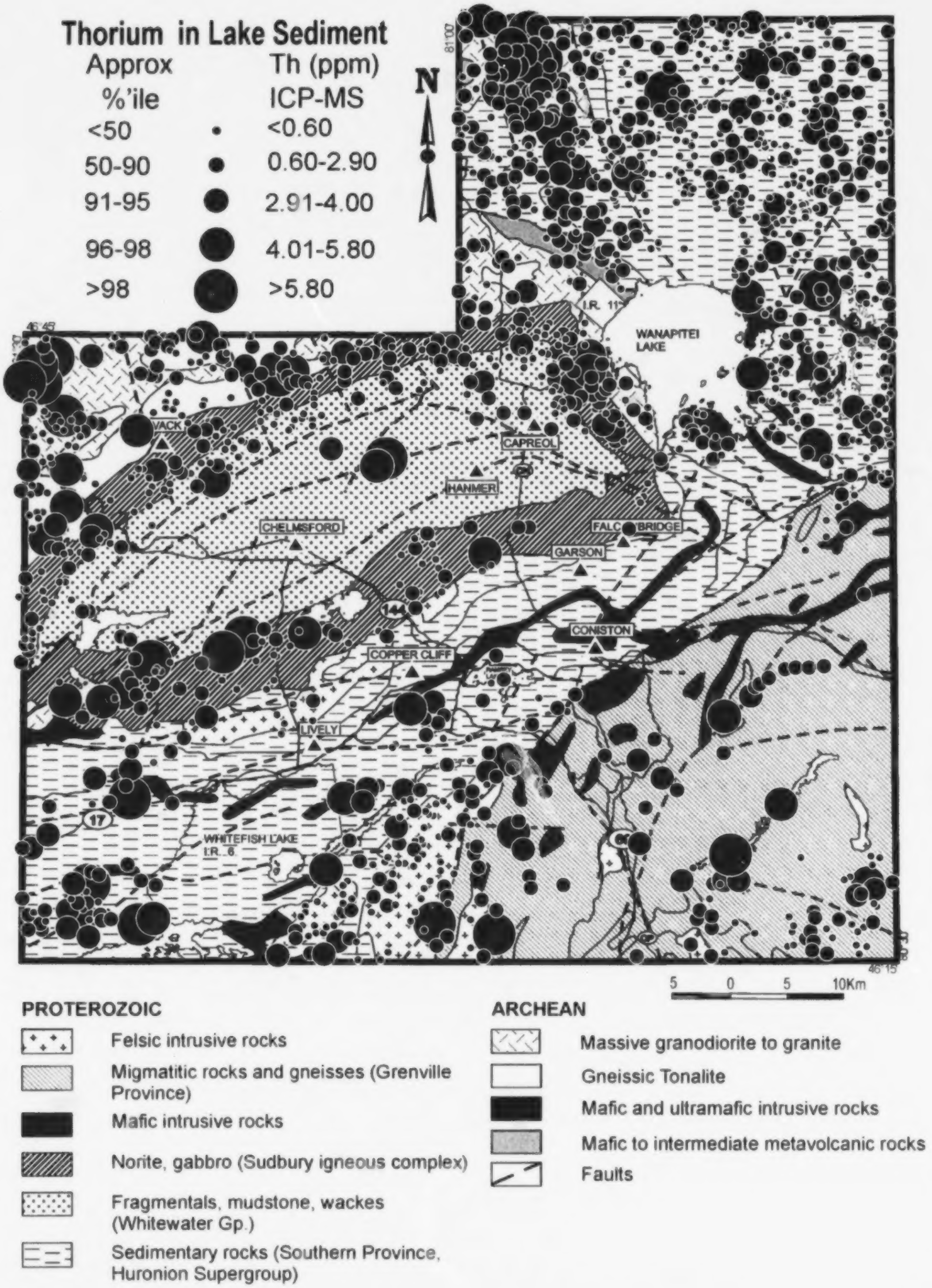

Strontium in Lake Sediment
Approx %'ile
Sr (ppm) ICP-OES
<50 <25
50-75 25-31
76-90 32-40
91-95 41-47
96-98 48-66
>98 >66
N
47°00'
81°00'
46°45'
81°30'
46°15'
80°30'
I.R. 11
WANAPITEI LAKE
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
5 0 5 10Km

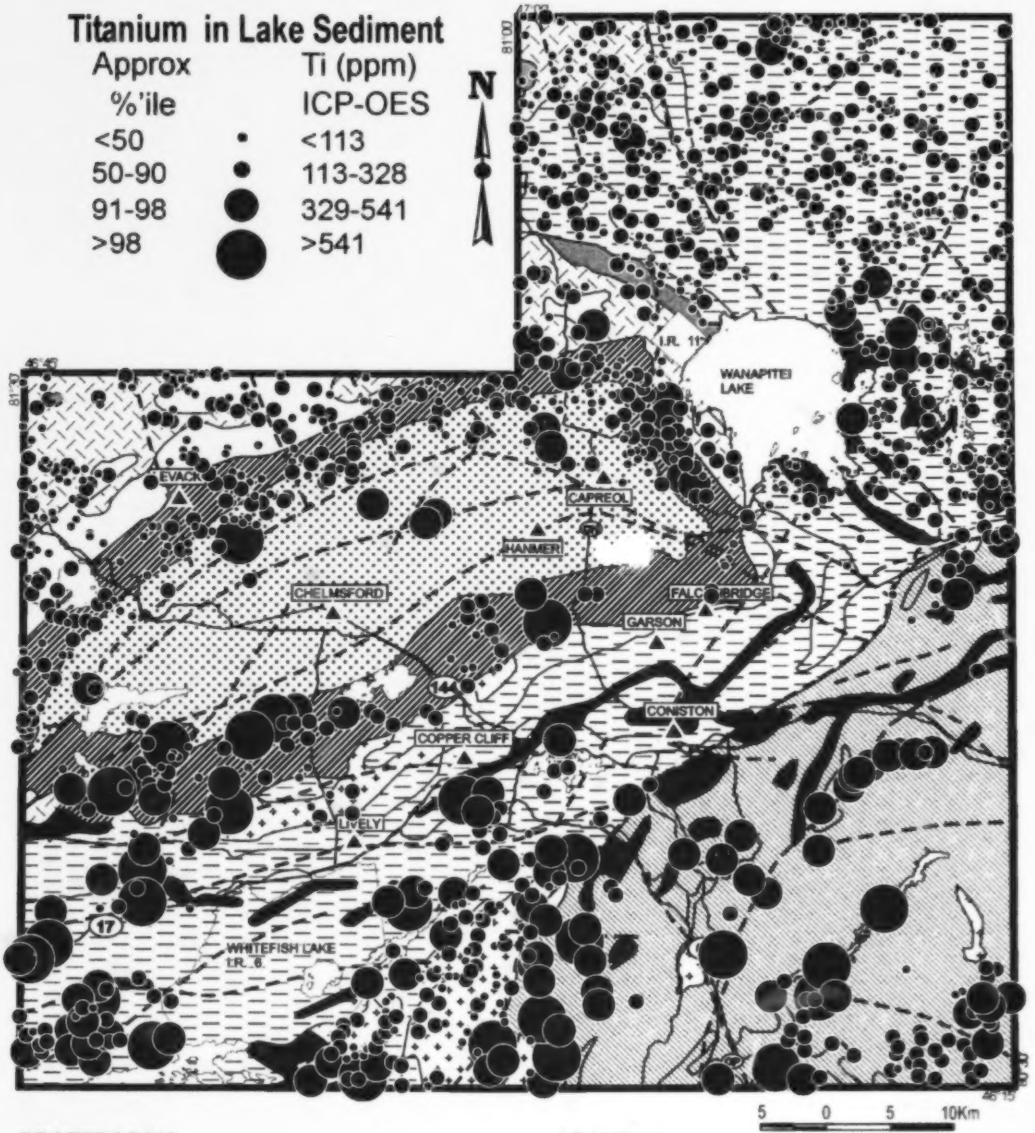
PROTEROZOIC

- Felsic intrusive rocks
- Migmatitic rocks and gneisses (Grenville Province)
- Mafic intrusive rocks
- Norite, gabbro (Sudbury igneous complex)
- Fragmentals, mudstone, wackes (Whitewater Gp.)
- Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

- Massive granodiorite to granite
- Gneissic Tonalite
- Mafic and ultramafic intrusive rocks
- Mafic to intermediate metavolcanic rocks
- Faults

 Thorium in Lake Sediment
Approx %'ile
Th (ppm) ICP-MS
<50 • <0.60
50-90 ● 0.60-2.90
91-95 ● 2.91-4.00
96-98 ● 4.01-5.80
>98 ● >5.80
N
81°00'
46°45'
46°15'
WANAPITEI LAKE
I.R. 11
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
144
17
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

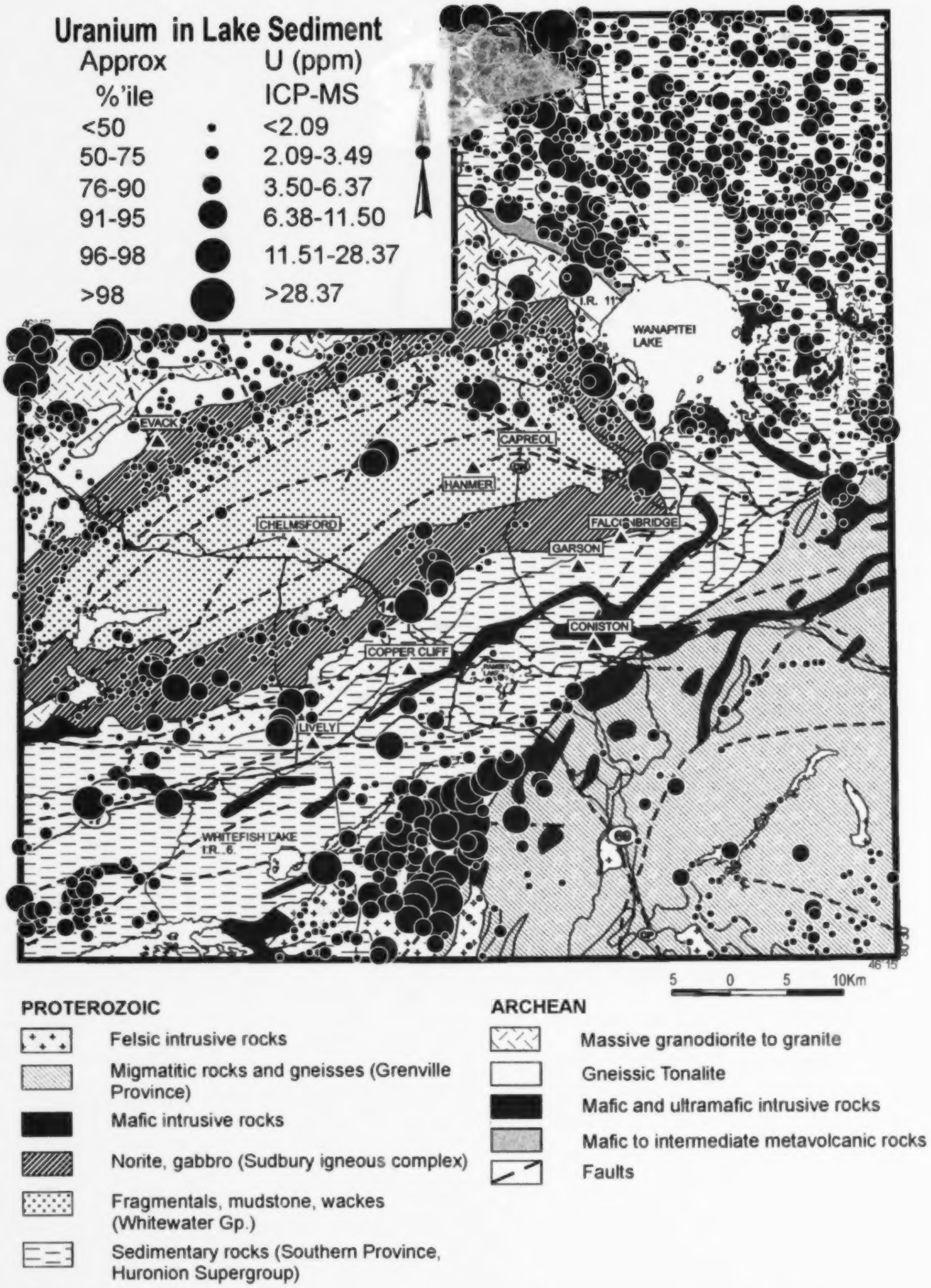

Titanium in Lake Sediment
Approx %'ile
Ti (ppm) ICP-OES
<50 ● <113
50-90 ● 113-328
91-98 ● 329-541
>98 ● >541
N
47°00'
81°00'
46°45'
81°30'
WANAPITEI LAKE
I.R. 11
EVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
144
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
80°30'
46°15'
5 0 5 10Km

PROTEROZOIC

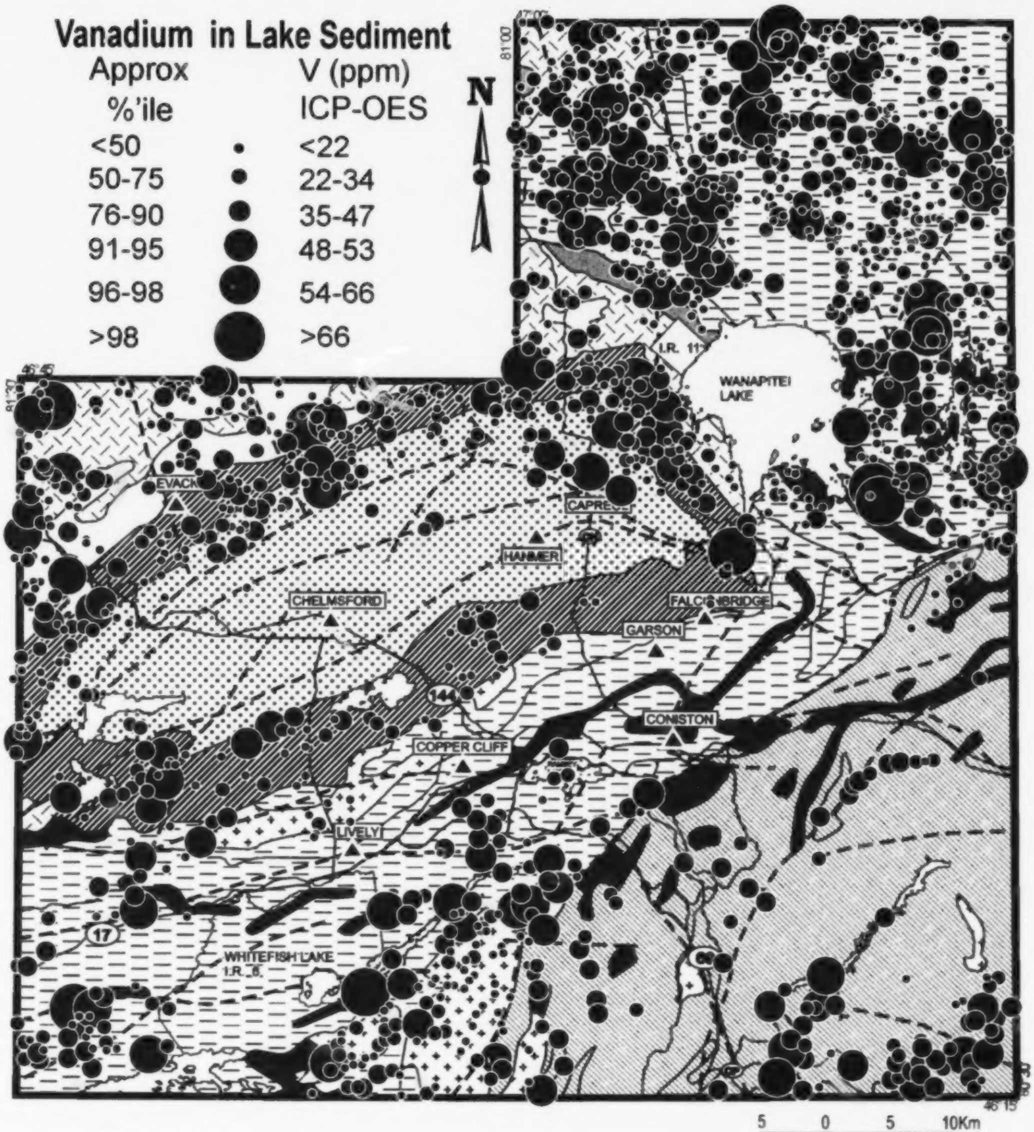
- ✢ Felsic intrusive rocks
- ░ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ⁘ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

- ▧ Massive granodiorite to granite
- □ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▒ Mafic to intermediate metavolcanic rocks
- ⟋ Faults


Uranium in Lake Sediment
Approx %'ile | U (ppm) ICP-MS
<50 • <2.09
50-75 • 2.09-3.49
76-90 ● 3.50-6.37
91-95 ● 6.38-11.50
96-98 ● 11.51-28.37
>98 ● >28.37
N
WANAPITEI LAKE
I.R. 11
EVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
14
46 15
80 30
5 0 5 10Km
PROTEROZOIC
Felsic intrusive rocks
Migmatitic rocks and gneisses (Grenville Province)
Mafic intrusive rocks
Norite, gabbro (Sudbury igneous complex)
Fragmentals, mudstone, wackes (Whitewater Gp.)
Sedimentary rocks (Southern Province, Huronion Supergroup)
ARCHEAN
Massive granodiorite to granite
Gneissic Tonalite
Mafic and ultramafic intrusive rocks
Mafic to intermediate metavolcanic rocks
Faults

Vanadium in Lake Sediment


Approx %'ile
V (ppm) ICP-OES
<50 • <22
50-75 • 22-34
76-90 ● 35-47
91-95 ● 48-53
96-98 ● 54-66
>98 ● >66
N
47°00'
81°00'
46°45'
81°37'
46°15'
I.R. 11
WANAPITEI LAKE
EVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
144
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
69
5 0 5 10Km

PROTEROZOIC

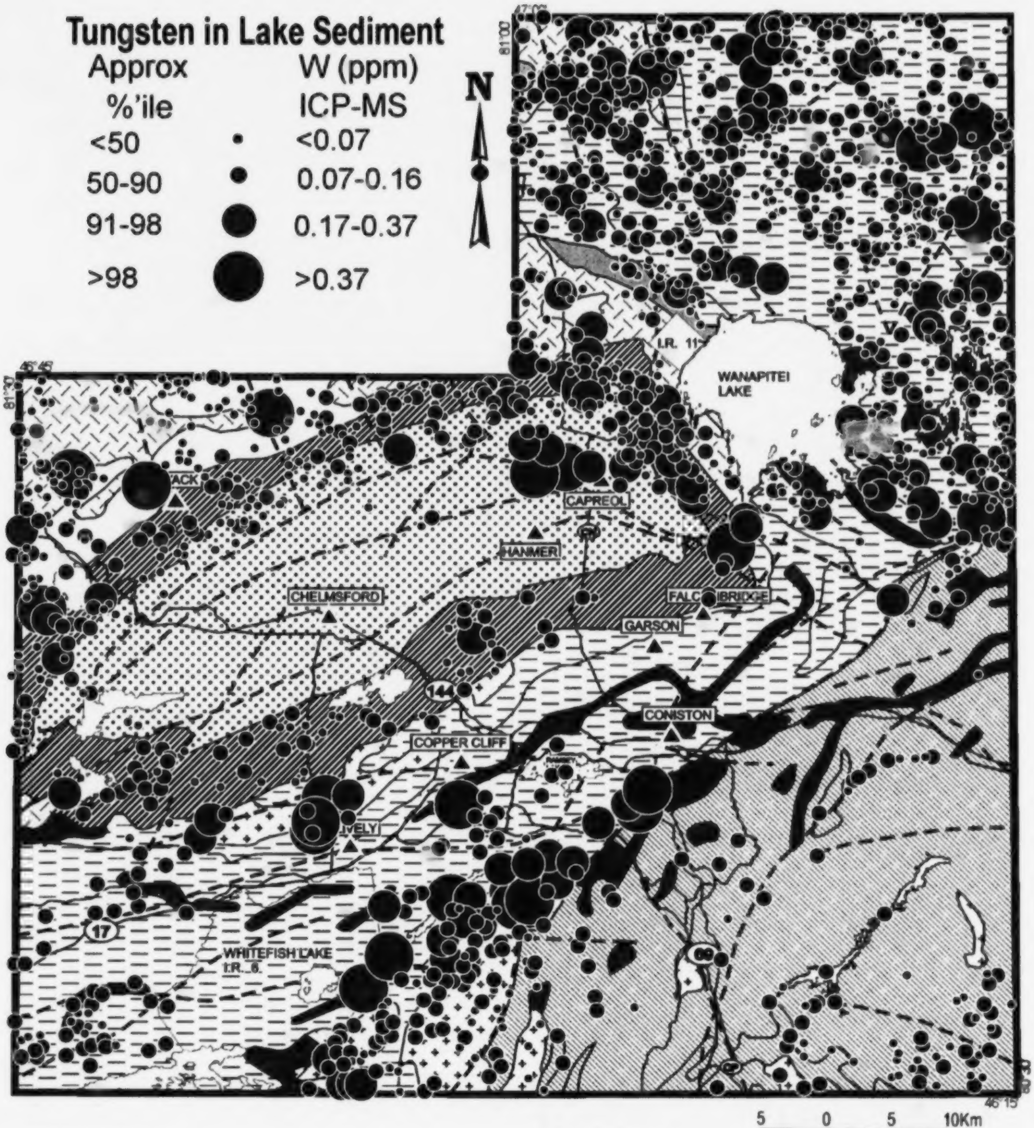
⁺⁺	Felsic intrusive rocks
▨	Migmatitic rocks and gneisses (Grenville Province)
■	Mafic intrusive rocks
▨	Norite, gabbro (Sudbury igneous complex)
⁙	Fragmentals, mudstone, wackes (Whitewater Gp.)
☰	Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

▨	Massive granodiorite to granite
☐	Gneissic Tonalite
■	Mafic and ultramafic intrusive rocks
▩	Mafic to intermediate metavolcanic rocks
⟋	Faults

Tungsten in Lake Sediment

Approx %'ile		W (ppm) ICP-MS
<50	•	<0.07
50-90	●	0.07-0.16
91-98	●	0.17-0.37
>98	●	>0.37

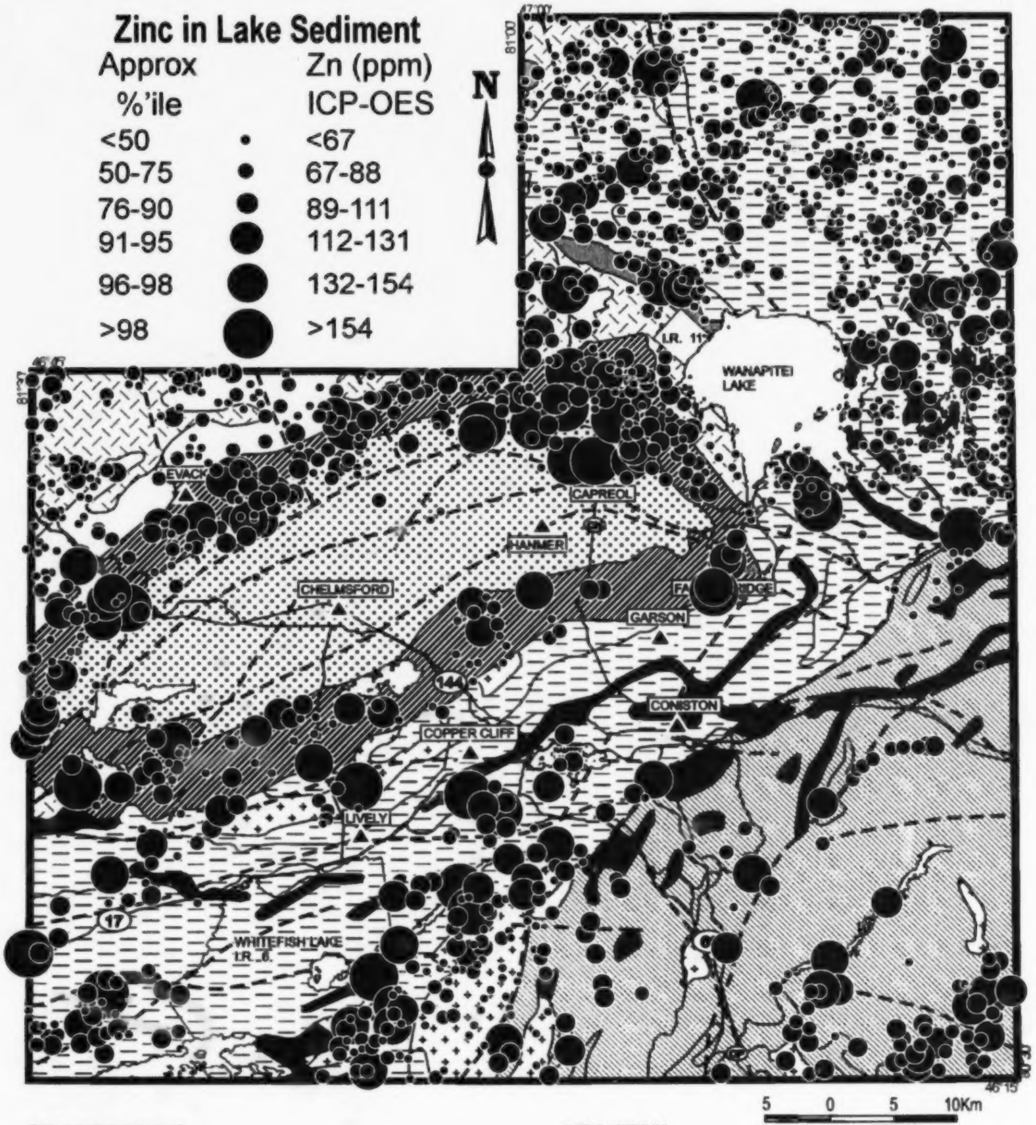

N
47°00'
81°00'
46°45'
81°30'
I.R. 11
WANAPITEI LAKE
ACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
144
CONISTON
COPPER CLIFF
LIVELY
17
WHITEFISH LAKE I.R. 6
69
80°30'
46°15'
5 0 5 10Km

PROTEROZOIC

- ☐ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ☐ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☐ Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

- ▨ Massive granodiorite to granite
- ☐ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▨ Mafic to intermediate metavolcanic rocks
- ☐ Faults

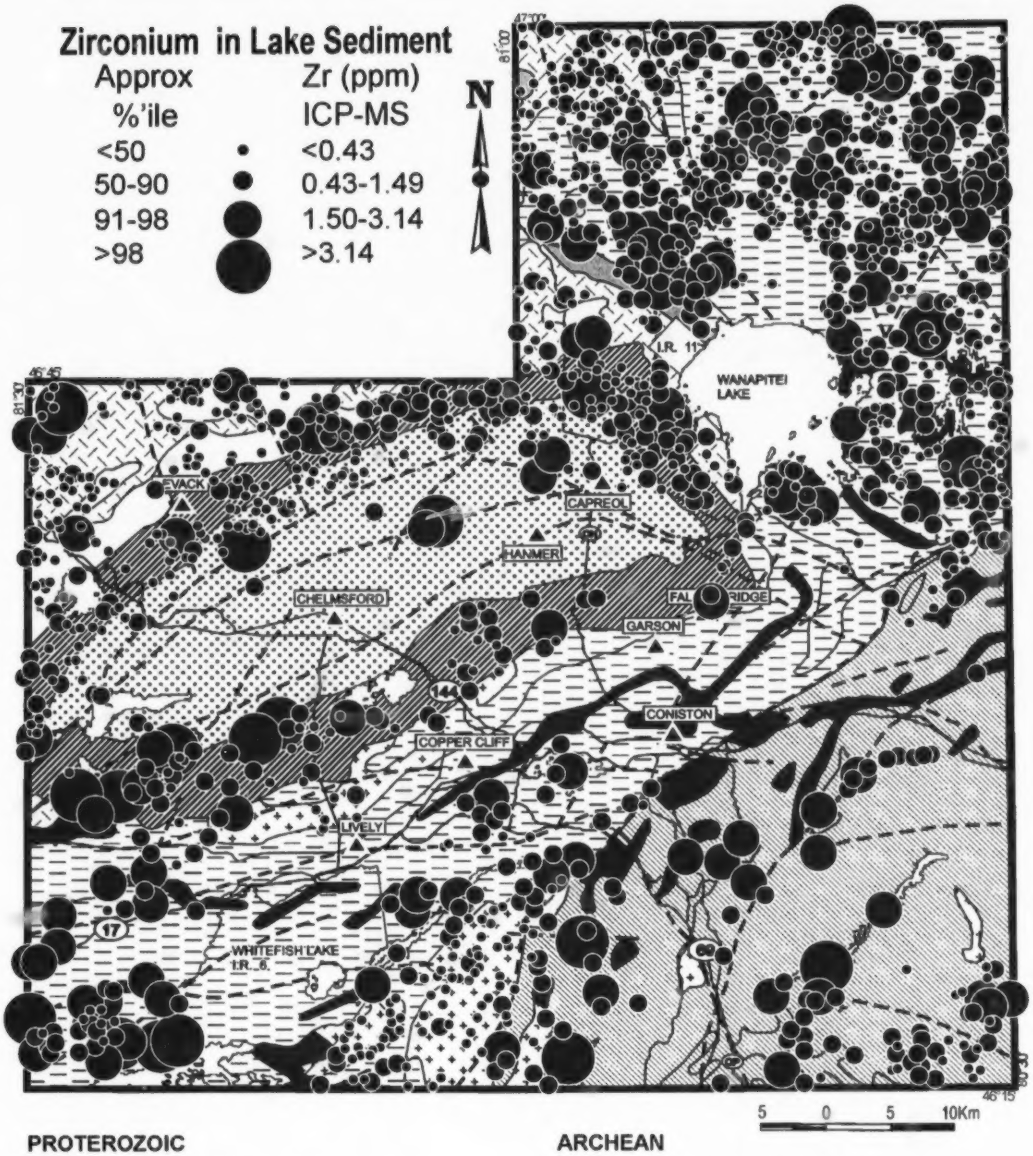

Zinc in Lake Sediment
Approx %'ile
Zn (ppm) ICP-OES
<50 <67
50-75 67-88
76-90 89-111
91-95 112-131
96-98 132-154
>98 >154
N
47°00'
81°00'
46°45'
81°22'
46°15'
80°30'
WANAPITEI LAKE
I.R. 11
CAPREOL
HANMER
CHELMSFORD
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
144
17
5 0 5 10Km

PROTEROZOIC

- ⁺ Felsic intrusive rocks
- ▨ Migmatitic rocks and gneisses (Grenville Province)
- ■ Mafic intrusive rocks
- ▨ Norite, gabbro (Sudbury igneous complex)
- ░ Fragmentals, mudstone, wackes (Whitewater Gp.)
- ☰ Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

- ▨ Massive granodiorite to granite
- ☐ Gneissic Tonalite
- ■ Mafic and ultramafic intrusive rocks
- ▒ Mafic to intermediate metavolcanic rocks
- ⁄ Faults


Zirconium in Lake Sediment
Approx %'ile
Zr (ppm) ICP-MS
<50 • <0.43
50-90 ● 0.43-1.49
91-98 ● 1.50-3.14
>98 ● >3.14
N
47°00'
81°00'
46°45'
81°30'
46°15'
80°30'
WANAPITEI LAKE
I.R. 11
LEVACK
CAPREOL
HANMER
CHELMSFORD
FALCONBRIDGE
GARSON
CONISTON
COPPER CLIFF
LIVELY
WHITEFISH LAKE I.R. 6
144
17
69
5 0 5 10Km

PROTEROZOIC

⁺⁺	Felsic intrusive rocks
▨	Migmatitic rocks and gneisses (Grenville Province)
■	Mafic intrusive rocks
▨	Norite, gabbro (Sudbury igneous complex)
⁚	Fragmentals, mudstone, wackes (Whitewater Gp.)
☰	Sedimentary rocks (Southern Province, Huronion Supergroup)

ARCHEAN

▨	Massive granodiorite to granite
☐	Gneissic Tonalite
■	Mafic and ultramafic intrusive rocks
▩	Mafic to intermediate metavolcanic rocks
⁄	Faults

Appendix C

Lake Sediment Analytical Data for Lake Depth, Loss-on-Ignition, pH, Conductivity, Temperature, Ag, As, Cd, Co, Cr, Cu, Fe, Na, Ni, Pb, Pd, Pt, S, U and Zn

Explanations:

Cond	Electrical conductivity measured from the YSI unit
ORP	Oxidation-reduction potential measured from the YSI unit
D.O.	Dissolved oxygen in percent saturation (%) and concentration (mg/L) measured from the YSI unit
Temp	Temperature in degrees Celsius measured from the YSI unit
NS	No Sample
INF	Insufficient sample for analysis
NM	Not Measured, sample lost at lab
MRD	Data are available in MRD 131

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method------------>		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	IFAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit------>			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units------------>		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
1	515639	5166367	0.5	NS	7.3	1065	17.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	513889	5167889	5.0	19.0	7.1	274	12.6	0.06	5.3	0.507	8.79	33	30	14269	141	34	4.85	1.2	1.0	1550	1.42	105
3	514753	5167931	6.0	57.2	7.2	289	14.7	0.12	6.6	1.213	8.21	23	59	8292	120	61	9.27	2.2	1.3	6152	0.78	104
4	517975	5167925	30.0	NS	7.2	2714	15.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
5	516983	5169197	1.0	82.5	NM	NM	NM	0.16	11.0	1.434	8.39	14	133	4514	43	168	20.70	3.9	2.3	9721	5.5	41
6	516600	5169820	1.0	28.0	NM	NM	NM	0.10	3.1	0.532	8.08	19	56	5600	70	134	7.63	1.2	0.8	2844	6.04	24
7	516830	5170843	3.5	31.9	NM	NM	NM	0.07	2.0	0.414	6.05	26	29	6389	165	25	6.76	0.8	<0.3	2659	4.62	28
8	516294	5170401	0.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
9	515467	5170657	0.9	42.8	NM	NM	NM	0.03	1.3	0.350	2.38	18	30	4579	44	25	2.74	0.6	<0.3	3725	2.29	14
10	514446	5170403	5.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
11	514474	5169508	4.5	63.3	NM	NM	NM	0.11	3.4	0.788	5.52	14	73	3172	88	92	5.73	1.3	0.6	4410	0.68	52
12	513778	5168831	6.5	18.1	NM	NM	NM	0.08	4.8	0.482	10.73	44	43	18608	132	44	7.38	1.3	1.4	1837	1.98	72
13	512784	5169351	6.0	26.5	NM	NM	NM	0.12	7.4	0.628	13.28	48	55	22404	111	54	8.24	2.3	2.2	2320	2.68	88
14	513784	5170111	13.0	33.8	NM	NM	NM	0.14	4.9	0.670	13.23	48	75	22397	104	76	10.16	2.0	1.7	2698	2.2	77
15	506234	5160270	2.5	39.1	NM	NM	NM	0.11	5.7	1.030	7.85	27	36	10704	101	37	5.76	1.9	1.1	3696	1.89	109
16	505312	5160161	2.0	44.9	6.0	31	22.9	0.15	6.6	1.077	8.25	26	48	8496	76	45	7.21	2.0	1.5	3385	2.04	101
17	501075	5160206	6.0	19.5	6.2	159	22.6	0.14	3.2	0.608	18.98	58	33	22959	210	69	7.47	1.0	0.9	1309	1.22	136
18	502250	5159300	7.0	NS	6.2	159	22.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
19	502443	5157980	4.0	14.0	6.3	156	21.6	0.06	4.4	0.341	12.61	47	43	15971	256	62	6.27	0.8	1.1	1656	1.45	60
20	502142	5156364	1.0	34.5	6.3	99	23.6	0.64	INF	1.506	44.45	36	1015	18696	190	1252	49.03	INF	INF	10589	0.85	73
21	511267	5168809	3.5	49.7	5.8	37	23.6	0.10	5.1	0.745	7.83	27	49	8884	105	47	6.54	INF	INF	5027	1.71	72
22	510209	5169652	3.5	67.6	4.3	27	12.7	0.08	1.5	1.038	1.55	5	41	2544	69	19	1.81	INF	INF	5064	0.9	76
23	510610	5169808	1.0	NS	4.8	26	20.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
24	512175	5170751	7.5	54.8	4.2	25	11.2	0.25	8.0	0.777	8.41	16	79	16171	81	36	9.09	1.8	1.8	11116	1.53	80
25	513142	5170430	10.5	35.0	5.3	37	22.1	0.11	2.6	0.846	16.55	49	223	9212	90	441	4.82	4.8	3.0	4259	1.68	72
26	512506	5171254	21.0	15.3	5.3	38	22.4	0.13	4.6	0.495	32.24	64	140	19041	104	428	8.48	4.0	7.1	1654	1.69	72
27	511943	5172013	5.0	52.2	5.2	38	21.4	0.13	5.7	0.918	32.85	22	88	15054	58	324	6.91	2.1	1.2	10103	3.01	76
28	512695	5172048	2.0	47.8	4.7	28	24.5	0.10	3.2	0.582	4.84	28	61	4414	47	88	5.96	1.8	1.2	3690	2.32	34
29	513128	5172454	12.0	53.8	5.0	30	22.2	0.20	5.3	0.881	19.64	20	79	12207	67	28	7.67	1.5	1.0	9072	6.6	100
30	513382	5172877	7.0	50.3	5.5	32	24.1	0.14	7.2	0.919	12.79	24	59	8504	70	46	9.39	1.6	1.0	7093	3.34	94
31	514867	5172989	1.0	68.5	4.8	27	24.6	0.14	5.3	0.551	5.80	9	37	3080	58	64	8.50	INF	INF	4279	3.34	24
32	514841	5171566	5.0	39.7	4.1	26	23.6	0.08	3.3	0.547	9.50	36	35	10737	62	33	5.72	2.0	0.8	2963	1.61	60
33	514160	5174135	3.0	NM	NM	NM	NM	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
34	514379	5174952	11.0	NM	5.3	52	16.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
35	512658	5174758	17.0	48.9	5.8	30	22.5	0.13	5.3	0.947	8.38	39	53	10821	80	31	10.23	INF	INF	5239	2.66	87
36	511638	5174226	1.0	30.6	5.9	47	26.7	0.06	4.8	0.458	10.47	35	44	12736	82	87	3.36	1.6	1.0	5794	3.16	54
37	511737	5173525	13.0	43.7	5.6	43	23.3	0.18	8.9	0.648	32.38	37	78	26279	83	136	15.12	2.3	1.8	5541	2.24	82
38	512472	5172994	3.0	18.9	6.0	36	24.5	0.12	5.4	0.495	10.50	31	138	7926	83	47	4.34	2.6	1.0	4024	20.2	67
39	511765	5172735	3.0	44.5	5.9	44	24.3	0.13	4.2	0.728	14.94	26	68	12218	63	163	6.03	2.1	1.7	7278	3.26	73
40	510794	5172818	14.0	26.3	5.8	36	22.6	0.16	8.1	1.093	57.34	66	66	69439	150	116	11.29	2.7	2.3	2239	2.01	143
41	510214	5174047	18.0	28.9	6.2	38	23.8	0.13	4.4	0.633	12.01	70	63	20089	135	80	9.46	2.5	2.3	2292	1.61	84
42	510015	5172976	7.0	19.6	6.1	37	23.7	0.07	4.7	0.517	21.71	47	34	46779	120	52	6.18	1.2	1.4	1269	1.66	108
43	510891	5171810	8.0	49.5	6.2	23	24.2	0.12	3.1	1.330	10.35	60	68	11498	62	53	8.40	INF	INF	3427	1.45	106
44	510338	5171202	5.0	37.8	6.0	36	22.4	0.11	4.4	0.729	7.78	38	55	12250	89	63	9.03	2.1	1.6	3671	1.8	71
45	509849	5171363	10.0	50.8	5.8	22	23.5	0.14	5.3	0.809	6.73	22	63	8272	67	62	11.91	2.4	3.6	5405	0.96	79
46	499508	5176715	7.0	45.0	7.8	26	22.5	0.14	5.4	0.876	6.94	29	51	12587	93	39	14.83	1.5	1.2	4203	2.5	72
47	498192	5176906	22.0	35.8	7.3	30	22.1	0.14	5.6	0.758	5.99	30	51	10960	94	42	14.30	1.5	1.7	3831	1.51	68
48	493193	5176862	6.0	59.6	7.3	21	22.8	0.21	7.7	1.216	8.57	14	46	8478	55	39	26.98	1.2	1.0	9152	1.26	107
49	493902	5176526	2.0	31.9	7.2	28	24.1	0.09	1.2	0.371	1.84	16	35	4297	45	16	4.86	1.0	0.9	3324	4.03	15
50	494241	5176358	10.0	58.2	6.9	19	22.9	0.21	9.0	1.228	6.67	12	53	8865	47	59	26.47	2.8	2.1	7853	0.99	92
51	494721	5176581	1.0	NS	6.6	29	23.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
52	495681	5176065	2.0	59.1	6.9	34	23.7	0.07	2.2	0.553	4.53	10	25	7876	66	14	3.80	<0.3	<0.3	7453	2.05	71
53	496929	5176094	1.0	43.4	6.7	28	24.2	0.06	2.7	0.438	3.22	15	24	3280	55	26	5.52	0.6	<0.3	2864	1.29	26
54	497547	5176499	11.0	53.1	6.5	26	23.2	0.23	8.9	1.013	11.15	23	60	13582	63	49	29.72	1.8	1.6	7724	1.17	76
55	497847	5176064	10.0	60.6	6.2	24	21.1	0.14	2.7	0.542	7.00	19	44	17947	67	17	4.01	0.6	<0.3	7562	1.41	67
56	499598	5175344	33.0	32.7	5.6	29	21.6	0.58	INF	2.907	14.17	28	143	19178	138	144	103.10	INF	INF	11973	1.31	123
57	498408	5175383	3.0	71.7	6.0	30	24.3	0.05	INF	0.718	4.64	18	40	8252	106	51	3.33	INF	INF	6981	1.89	76
58	493991	5175307	2.0	36.5	5.8	29	23.8	0.05	1.6	0.339	1.85	10	23	2692	51	13	2.33	INF	INF	3021	3.48	15
59	492491	5175769	19.0	34.7	5.8	27	22.4	0.10	2.4	0.648	5.20	31	37	12420	88	23	7.97	0.9	1.5	2719	2.59	78
60	491853	5175641	3.0	58.3	5.7	27	24.3	0.09	2.0	0.630	6.98	15	28	7444	55	32	3.70	INF	INF	5059	2.36	70
61	491361	5176734	6.0	58.7	5.3	25	24.1	0.08	1.3	0.941	6.38	19	30	2969	43	20	3.94	0.7	1.0	4395	2.05	96
62	489625	5176779	12.0	NS	4.2	23	22.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
63	488318	5177098	3.0	54.4	4.7	20	22.8	0.12	1.3	0.717	3.16	16	40	4312	45	26	7.10	1.0	1.5	3615	1.43	51
64	489814	5175743	15.0	28.1	5.4	25	22.7	0.14	2.3	0.660	15.13	39	74	12154	88	97	8.17	3.3	3.0	3244	2.54	88
65	490839	5175293	5.0	54.0	5.5	26	24.3	0.22	7.9	1.395	6.74	12	55	6538	58	64	31.44	2.6	7.4	9181	1.49	88
66	491413	5175030	20.0	NS	5.7	27	22.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
67	492679	5174210	30.0	NS	5.8	25	21.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
68	498519	5174972	29.0	51.1	7.8	NM	15.1	0.10	3.3	1.142	8.50	26	34	9042	59	24	7.81	1.2	0.7	4422	1.57	77
69	494675	5174377	6.0	54.1	4.6	29	20.4	0.10	1.0	0.592	1.84	8	25	4109	47	11	2.63	<0.3	<0.3	3397	0.9	55
70	493990	5174607	22.0	35.5	5.5	26	20.7	0.13	3.8	0.693	6.51	31	41	10958	85	29	12.28	1.4	1.2	2917	2.54	78
71	493695	5173573	15.0	36.9	5.8	22	21.7	0.09	INF	1.192	6.03	23	37	20982	52	34	8.77	INF	INF	3531	2.07	111
72	489972	5173269	9.0	51.1	5.9	30	22.3	0.14	1.7	0.606	6.52	19	30	7722	69	16	5.13	0.5	1.4	3154	2.6	58
73	489995	5174138	12.0	39.0	5.8	20	22.3	0.12	2.5	0.976	6.44	27	39	11716	71	27	8.12	0.8	0.8	3634	3	81
74	489074	5175074	5.0	57.1	5.9	27	22.3	0.27	1.2	0.943	18.18	50	97	11479	56	71	4.70	2.8	1.8	7728	1.87	111
75	488479	5175267	3.0	52.4	5.3	26	22.9	0.10	1.8	0.729	13.13	18	48	9421	45	35	4.82	0.9	<0.3	4816	2.04	81
76	488116	5175199	12.0	61.8	4.5	33	22.5	0.15	INF	0.711	10.71	26	36	12513	50	19	4.97	INF	INF	7581	1.35	68
77	485483	5175812	8.0	70.4	5.0	26	18.7	0.08	1.3	0.639	2.04	5	34	8581	55	10	1.91	INF	INF	6346	0.55	79
78	484281	5176158	2.0	41.8	4.6	24	21.3	0.14	INF	0.441	3.60	15	32	3704	47	34	14.86	INF	INF	2738	2.46	20
79	481807	5176291	3.0	56.7	5.1	22	22.7	0.14	1.9	0.819	5.37	22	36	5329	47	29	36.36	0.7	<0.3	3893	1.76	68
80	481739	5177207	3.0	53.2	4.1	31	22.1	0.08	1.1	0.418	2.94	15	22	2535	46	17	4.29	<0.3	<0.3	2795	1.24	28
81	478919	5176494	4.0	40.2	5.5	28	23.2	0.08	<0.5	0.401	3.89	19	34	2192	48	21	3.01	<0.3	<0.3	3230	1.77	44
82	477494	5177195	9.0	55.4	5.6	27	22.6	0.24	3.6	0.711	20.13	26	48	32345	50	20	7.27	1.0	0.6	9203	3.6	95
83	476867	5177419	17.0	51.2	5.6	27	22.2	0.17	3.0	0.760	12.64	26	38	21665	54	16	6.90	1.0	0.6	6547	3.48	74
84	475627	5177317	1.0	41.4	5.5	22	22.7	0.08	2.1	0.431	2.69	15	23	2740	35	20	6.47	INF	INF	2610	5.57	12

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method------------------>		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit------->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units------------------>		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
85	474740	5177030	3.0	54.7	4.7	27	22.3	0.08	<0.5	0.554	4.87	11	24	2621	35	19	3.30	<0.3	<0.3	3196	7.36	47
86	474079	5176946	4.0	52.8	4.7	19	22.8	0.10	1.3	0.698	4.32	15	29	2341	36	19	6.90	<0.3	<0.3	4175	5.78	69
87	472889	5177202	4.0	51.5	4.9	22	22.1	0.07	1.3	0.649	2.91	13	26	4124	38	14	4.42	<0.3	<0.3	3248	3.48	58
88	473300	5176650	7.0	54.7	4.7	22	20.6	0.13	2.1	0.662	3.59	15	31	9132	53	18	6.58	<0.3	<0.3	4621	4.04	68
89	474318	5176345	4.0	68.7	4.6	25	21.0	0.08	2.6	0.865	3.78	18	33	9128	61	14	4.30	INF	INF	4278	1.89	91
90	474604	5175988	1.0	63.8	4.5	23	19.4	0.26	2.5	0.760	3.52	10	29	2672	59	31	14.08	0.8	1.8	3797	2.6	40
91	475085	5175826	1.0	71.3	4.7	17	20.3	0.07	2.1	0.496	2.92	10	23	1707	62	18	6.65	<0.3	<0.3	3378	0.76	15
92	476444	5175021	4.0	50.2	4.7	23	21.9	0.08	1.5	0.422	3.34	16	19	4364	61	13	3.92	<0.3	<0.3	2884	0.74	35
93	477258	5174955	1.0	48.3	4.5	24	22.4	0.08	2.3	0.581	3.38	14	26	3416	47	26	8.57	0.9	0.6	3301	1.16	20
94	477780	5175482	5.0	52.1	4.7	25	20.6	0.18	1.4	0.588	3.12	22	30	8336	50	17	4.89	<0.3	<0.3	3914	1.3	73
95	478395	5174522	1.0	43.2	4.6	25	22.3	0.06	0.9	0.402	6.04	23	20	6406	61	21	5.02	<0.3	<0.3	2833	1.39	27
96	479950	5173854	13.0	48.0	5.5	26	22.7	0.13	2.7	0.674	15.64	22	35	11362	68	22	11.51	<0.3	<0.3	4700	2.04	67
97	479715	5174870	2.0	45.2	4.6	22	22.6	0.08	1.2	0.444	2.56	13	23	2513	46	13	3.31	<0.3	<0.3	2903	0.99	37
98	479126	5175397	1.0	46.0	4.8	23	22.3	0.12	2.5	0.649	5.26	21	35	4608	58	43	13.10	1.5	1.1	4091	1.48	34
99	479616	5175748	1.0	45.7	5.1	24	21.5	0.09	<0.5	0.396	3.41	16	19	3920	46	16	4.58	<0.3	<0.3	2994	2.85	18
100	480498	5174911	1.0	NS	5.3	25	20.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
101	481167	5174568	3.0	56.1	5.3	26	22.7	0.07	<0.5	0.596	7.57	21	34	6155	76	16	2.48	0.7	<0.3	9677	2.73	72
102	481698	5173276	2.0	35.4	5.0	26	22.3	0.12	2.8	0.810	8.88	29	37	6530	71	59	14.00	1.4	1.0	3944	1.66	51
103	481677	5172889	1.0	NS	5.0	24	22.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
104	482311	5172514	17.0	55.0	5.2	26	22.9	0.18	3.1	0.883	14.79	34	53	16700	64	23	5.37	INF	INF	7663	2.12	97
105	482619	5173954	4.0	50.8	5.3	28	21.6	0.08	0.9	0.551	2.84	12	24	4821	52	16	3.06	<0.3	<0.3	4823	1.34	64
106	484202	5173752	6.0	54.3	5.4	26	23.1	0.12	2.3	0.494	7.98	41	33	85014	50	29	8.14	0.9	0.7	7095	2.29	74
107	483597	5174794	6.0	54.7	5.6	35	22.9	0.06	0.9	0.416	2.74	10	20	2278	58	16	2.72	<0.3	<0.3	5110	3.36	34
108	484630	5174470	7.0	54.0	5.8	32	22.4	0.14	2.4	0.814	8.37	26	36	12115	57	22	5.68	0.7	<0.3	4894	1.78	80
109	485494	5174147		51.6	6.1	33	21.5	0.37	16.0	1.792	19.81	25	105	26680	75	140	52.46	5.6	4.5	14336	1.78	122
110	484932	5173694	4.0	66.3	5.7	22	22.9	0.08	1.4	0.549	7.22	19	22	6711	63	26	4.41	INF	INF	5422	0.71	69
111	485255	5172998	5.0	71.6	5.9	21	22.5	0.09	1.9	0.732	9.07	24	35	7720	62	48	5.53	0.6	0.7	6334	1.34	104
112	485848	5173276	7.0	68.1	5.6	24	21.5	0.11	4.5	0.720	6.80	14	32	6134	80	37	14.88	1.1	0.9	7601	1.3	75
113	486575	5173117	6.0	80.0	5.0	31	17.7	0.11	1.7	1.142	3.81	8	39	7203	79	14	3.26	<0.3	<0.3	6812	1.06	208
114	486898	5172846	2.0	64.6	5.4	21	21.9	0.11	3.9	0.565	4.50	25	29	8501	52	26	10.85	0.9	0.8	4679	0.5	78
115	487876	5173486	4.0	66.0	5.7	26	22.2	0.12	2.5	0.692	3.88	16	43	2884	55	19	7.19	INF	INF	5359	2.07	102
116	491195	5171646	2.0	50.1	4.9	29	22.9	0.12	2.8	1.585	4.48	19	46	5219	71	25	11.71	1.0	0.7	5045	2.26	96
117	493434	5173114	1.8	42.7	5.1	24	22.7	0.08	1.5	0.677	5.37	13	24	3687	46	20	4.17	0.7	<0.3	3641	1.54	53
118	494490	5172684	2.0	33.1	5.5	29	22.5	0.08	0.5	0.767	3.64	12	22	4326	60	21	3.52	0.7	<0.3	4462	2.25	52
119	496657	5172520	3.0	71.1	5.2	17	21.5	0.14	2.0	1.270	4.76	23	35	2986	56	19	4.68	0.7	<0.3	5241	1.23	145
120	497046	5173210	15.0	60.1	5.6	23	22.6	0.22	3.1	2.429	5.55	34	56	5029	50	27	11.58	INF	INF	5518	1.81	190
121	498218	5173930	1.0	NS	5.4	23	21.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
122	498430	5174166	1.0	49.2	5.2	25	22.2	0.24	INF	1.656	9.44	11	79	5818	62	137	32.45	INF	INF	5822	1.38	80
123	487358	5172237	7.0	55.8	7.6	26	21.1	0.10	0.5	0.818	3.90	20	22	4069	47	18	5.26	<0.3	<0.3	3813	1.44	54
124	487417	5171763	4.0	49.7	7.3	20	21.5	0.08	1.2	0.741	6.42	20	27	5719	47	26	5.64	0.8	<0.3	3689	1.6	70
125	487317	5171153	8.0	48.4	6.6	24	21.9	0.08	1.6	0.568	2.85	18	23	3530	56	18	2.59	<0.3	<0.3	3684	1.17	49
126	484833	5171104	9.0	52.3	6.3	20	21.9	0.15	1.7	0.762	9.53	23	29	15533	86	20	8.71	0.7	<0.3	4136	1.57	77
127	483444	5170716	6.0	55.5	6.2	24	21.9	0.10	1.9	0.657	3.18	12	25	5305	56	15	3.86	<0.3	<0.3	5124	1.08	67
128	482704	5171566	3.0	43.6	6.0	26	22.1	0.04	1.4	0.536	8.65	19	24	3371	36	13	2.10	0.5	1.2	3610	2.12	65
129	479919	5171820	15.0	62.3	6.0	20	22.2	0.20	2.3	1.076	4.72	21	49	2842	44	23	6.85	2.4	10.9	5998	2.67	82
130	475084	5173574	10.0	53.6	5.9	23	21.6	0.15	2.6	0.689	13.62	27	38	19510	62	25	9.57	0.7	<0.3	4912	1.59	81
131	473220	5173620	2.0	34.7	5.5	21	22.0	0.10	2.3	0.561	4.65	33	45	5000	65	30	9.81	0.9	0.7	3126	2.17	52
132	472850	5173755	5.0	48.9	5.5	22	21.5	0.19	1.4	0.791	5.25	26	37	5456	45	18	5.29	<0.3	0.8	3699	1.53	100
133	471884	5173918	3.0	43.0	4.9	23	19.9	0.06	1.3	0.445	3.68	17	20	4420	57	17	3.77	<0.3	1.0	2683	1.26	52
134	473377	5174652	1.0	39.4	5.2	24	21.7	0.10	1.4	0.394	3.03	12	33	2423	50	26	8.89	0.9	0.9	3609	2.46	26
135	472848	5176062	9.0	46.0	5.1	22	21.8	0.15	1.6	0.461	3.61	21	32	7720	62	13	6.54	INF	INF	3113	2.67	56
136	470182	5176381	1.0	43.2	5.3	24	22.4	0.03	1.7	0.409	6.15	13	25	6414	46	17	5.02	0.7	<0.3	3456	17.8	56
137	469688	5177245	2.0	67.0	5.5	26	21.9	0.03	1.6	0.667	10.05	13	28	8370	74	20	8.01	INF	INF	5129	14.4	74
138	469399	5176443	2.0	39.3	5.4	23	21.5	0.04	1.3	0.357	2.58	9	23	2908	58	15	8.26	<0.3	<0.3	3396	21.4	31
139	467666	5174946	12.0	66.1	4.9	NM	21.3	0.04	1.4	0.598	4.06	8	24	6653	55	10	4.97	<0.3	<0.3	3787	3.26	64
140	467512	5175505	14.0	47.3	5.5	21	22.0	0.12	6.2	0.873	10.33	20	40	13051	73	20	27.11	1.0	1.9	4640	12.6	70
141	464248	5175396	5.0	60.5	5.6	21	21.4	0.07	3.2	0.478	7.25	25	26	81458	46	19	8.67	<0.3	<0.3	4040	4.39	77
142	463688	5175440	10.0	59.4	5.6	21	21.9	0.06	2.8	0.577	5.35	16	26	11315	55	17	12.10	<0.3	<0.3	4288	5.46	58
143	463321	5176333	7.0	71.3	5.2	19	21.3	0.07	1.8	0.824	1.98	6	22	5488	42	9	6.67	INF	INF	5119	5.68	92
144	463669	5177050	9.0	75.8	5.2	14	20.8	0.06	2.1	1.111	3.63	11	28	7113	38	12	5.63	<0.3	<0.3	4842	8.21	107
145	461831	5176758	9.0	58.1	5.3	17	21.9	0.04	2.3	0.793	4.52	12	20	3934	51	13	10.36	<0.3	<0.3	4541	9.84	67
146	462784	5174749	NM	45.5	5.6	24	21.9	0.11	2.5	0.726	8.38	24	27	17400	101	15	15.42	INF	INF	2984	12.1	74
147	474405	5172161	8.0	55.7	5.3	22	22.2	0.08	1.9	0.455	2.75	18	22	8284	50	15	4.01	INF	INF	4261	0.92	57
148	474127	5171422	8.0	63.0	4.9	25	21.8	0.06	1.4	0.559	2.28	10	30	5973	59	13	2.84	0.9	1.3	4951	0.59	59
149	475032	5171495	8.0	58.2	4.7	22	21.3	0.08	1.7	0.661	2.42	18	32	4978	61	19	4.44	<0.3	<0.3	4297	0.96	59
150	477622	5171587	3.0	64.2	4.8	20	21.7	0.03	1.3	0.630	3.30	15	18	2565	47	18	2.35	INF	INF	4055	0.53	47
151	477536	5171124	15.0	58.6	5.2	22	22.4	0.16	1.5	0.806	9.42	28	53	11769	62	20	4.02	0.6	<0.3	7149	1.35	75
152	478016	5169671	7.0	63.3	5.4	22	22.5	0.06	1.2	0.750	6.42	14	26	3451	85	12	2.80	INF	INF	5107	1.32	93
153	478622	5169492	2.0	56.8	5.5	24	22.2	0.04	1.5	0.538	4.67	9	23	2124	58	17	3.03	<0.3	<0.3	4643	1.18	64
154	479360	5168975	7.0	54.2	5.5	22	22.4	0.07	3.3	0.830	5.72	17	31	9061	58	23	9.24	1.0	0.8	5474	1.23	74
155	480215	5169205	6.0	52.9	5.6	24	22.3	0.07	2.7	0.783	5.44	12	26	10272	46	18	7.93	<0.3	<0.3	4919	1.74	89
156	482673	5170548	4.0	55.9	5.1	19	19.9	0.03	2.1	0.759	1.60	9	28	3416	42	12	2.05	<0.3	<0.3	4163	1.18	76
157	482620	5169726	7.0	42.9	5.3	11	22.1	0.11	2.3	0.922	15.42	30	50	11479	84	32	7.28	1.3	0.8	5961	3.02	101
158	484047	5170342	19.0	44.6	5.1	19	21.0	0.08	3.5	1.130	6.13	33	45	8686	71	29	8.86	1.6	1.2	3803	2.04	73
159	483742	5169483	5.0	38.1	4.9	22	22.3	0.08	1.5	0.590	3.37	17	23	4010	45	17	3.58	<0.3	<0.3	3081	1.08	47
160	485719	5169797	10.0	53.5	4.9	15	22.3	0.09	2.8	1.101	16.35	33	34	15775	58	26	6.59	<0.3	0.7	5642	1.1	91
161	486279	5170015	6.0	52.4	4.7	17	22.0	0.10	4.0	1.111	5.57	23	39	7345	50	37	11.61	1.0	0.9	4446	0.84	68
162	486460	5170332	26.0	56.6	4.8	17	22.1	0.14	4.2	0.885	19.18	37	38	23566	56	26	11.55	INF	INF	5740	1.53	88
163	487194	5169836	2.0	47.1	4.7	21	21.8	0.04	2.6	0.447	3.23	10	17	3817	84	21	9.18	<0.3	<0.3	3036	0.74	59
164	487174	5169308	1.0	19.4	NM	NM	NM	0.08	7.5	0.335	5.03	26	26	9988	58	34	21.69	1.1	1.2	1019	1.29	27
165	487435	5168651	1.0	NS	5.4	30	22.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
166	489207	5170260	1.0	<10	4.4	22	22.3	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
167	488018	5170275	6.0	48.3	4.3	20	22.9	0.04	2.1	0.768	5.67	23	33	6806	40	25	3.37	<0.3	<0.3	3694	1	60
168	485421	5169240	3.0	40.0	4.5	19	23.8	0.05	1.4	0.887	5.37	21	22	5309	78	25	7.52	<0.3	1.7	3318	1.2	48

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method------------>		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit----->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units------------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
169	485187	5168875	13.0	58.4	5.0	23	23.3	0.15	3.7	0.601	17.79	28	44	33256	101	30	10.57	0.9	1.7	9307	1.07	79
170	482246	5167750	9.0	48.4	5.3	22	23.5	0.12	3.0	0.963	11.70	29	45	13947	59	34	8.29	1.5	1.0	11074	1.59	95
171	481917	5167425	2.0	52.0	5.5	27	22.4	0.05	2.5	1.656	5.52	21	41	5456	66	36	7.50	1.3	0.8	5956	1.69	71
172	481212	5167875	8.0	56.7	5.6	23	22.5	0.06	1.5	0.907	2.36	7	37	3262	47	18	4.72	0.9	<0.3	5827	1.24	89
173	480886	5168020	11.0	51.8	5.5	21	22.6	0.46	22.0	2.302	12.67	20	126	13555	60	162	68.66	8.3	5.4	12891	1.36	129
174	478695	5168400	14.0	50.6	5.8	25	22.7	0.18	6.8	1.274	11.29	30	51	11937	66	31	17.52	1.3	1.1	6290	2.11	111
175	477790	5168900	13.0	40.9	5.9	22	22.3	0.10	4.4	2.306	32.94	48	46	39293	66	44	8.55	1.6	1.3	3007	3.08	275
176	476660	5168800	16.0	23.7	5.9	22	22.3	0.04	2.9	1.238	9.60	34	24	17308	86	22	8.60	1.1	0.9	2219	1.58	117
177	476190	5169650	12.0	57.9	6.0	20	22.6	0.13	2.3	0.861	7.29	30	41	11041	68	18	7.10	<0.3	<0.3	5006	1.04	80
178	475567	5170250	1.0	57.3	5.2	66	23.9	0.05	1.8	0.384	8.12	17	67	3483	81	119	3.56	0.9	0.6	5471	0.93	23
179	488827	5167150	1.0	13.9	5.5	75	24.1	0.12	6.2	0.633	12.22	53	26	15777	110	51	12.70	1.5	1.2	1264	1.19	72
180	493706	5166385	1.0	23.6	5.9	42	24.3	0.36	4.8	1.758	6.74	74	79	15438	175	49	11.37	2.0	1.6	1397	25.5	52
181	492853	5165800	1.0	25.4	5.8	43	21.8	0.31	4.3	0.394	9.68	71	49	20051	131	55	11.70	1.7	1.3	1595	6.43	50
182	480698	5166569	3.0	34.7	7.6	26	23.2	0.04	<0.5	0.606	8.45	22	16	8551	52	17	14.70	<0.3	<0.3	2010	1.11	86
183	480297	5167354	15.0	55.0	7.2	22	22.8	0.11	3.5	0.787	11.24	28	46	16580	54	22	7.09	0.8	0.7	4792	1.73	78
184	479489	5167196	11.0	57.1	6.7	22	22.6	0.12	2.8	0.930	4.67	19	49	6460	44	20	6.83	<0.3	<0.3	4433	1.56	98
185	479671	5167867	6.0	45.6	6.4	23	22.3	0.10	1.8	1.221	4.13	12	38	4372	37	16	5.33	0.6	<0.3	4020	1.2	125
186	477942	5167301	3.0	44.8	6.1	22	22.2	0.07	0.9	0.549	5.29	13	32	2335	42	20	3.00	<0.3	<0.3	3957	1.56	58
187	477478	5167415	9.0	44.2	6.4	26	22.7	0.05	1.5	0.708	6.29	30	28	9683	75	24	5.50	1.3	4.5	3484	1.95	84
188	476363	5167179	7.0	NS	3.1	2639	22.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
189	474805	5170835	7.0	55.0	3.7	408	22.8	0.12	2.7	0.752	7.32	27	82	6926	51	33	9.71	1.9	1.0	4258	0.73	58
190	520077	5169552	2.0	88.1	5.5	28	20.4	0.07	2.2	0.379	1.42	9	24	3144	53	11	2.88	1.8	0.9	4075	3.76	8
191	520050	5168568	1.0	49.1	5.9	63	22.5	0.27	41.0	1.784	18.65	25	205	13945	49	291	32.44	INF	INF	9163	2.97	61
192	520687	5168819	5.0	74.2	6.1	44	23.5	0.06	INF	0.766	7.14	33	44	3193	62	22	3.30	INF	INF	7984	5.01	82
193	520712	5168335	5.0	73.2	5.9	35	19.4	0.09	5.0	0.779	4.73	8	45	3888	59	42	7.32	2.2	1.2	7112	0.77	65
194	521537	5167773	1.0	46.4	6.1	43	23.2	0.07	5.3	0.342	4.18	8	47	1775	44	28	4.00	1.7	0.8	5316	1.52	32
195	521198	5170423	2.0	48.6	5.9	37	22.3	0.05	INF	0.614	3.86	14	49	3316	47	31	3.77	INF	INF	4403	0.72	40
196	521681	5170229	1.0	69.2	5.8	36	23.6	0.56	INF	3.079	24.80	16	529	9774	295	763	81.01	INF	INF	17774	0.54	111
197	521799	5168992	10.0	59.2	5.6	30	20.9	0.11	2.5	0.624	5.19	19	52	6190	44	21	2.91	2.4	1.3	5699	0.72	56
198	522767	5168285	43.0	37.5	6.2	48	22.6	0.13	3.5	0.474	6.75	43	72	8719	111	33	6.98	2.8	2.2	3218	1.35	47
199	522678	5167585	15.0	64.9	6.5	37	23.0	0.53	69.1	2.945	26.11	24	486	23172	67	591	98.76	24.2	18.9	15307	0.52	134
200	523775	5167586	1.0	68.0	6.3	45	24.0	0.08	6.0	0.796	5.54	14	62	3034	55	58	8.03	2.6	1.6	5949	0.54	47
201	524807	5169227	11.0	NS	5.8	NM	21.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
202	525516	5170798	11.0	NS	6.3	57	19.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
203	527737	5169210	6.0	54.1	6.0	NM	22.3	0.10	6.4	0.579	11.28	28	32	24933	56	21	4.32	1.1	0.8	4278	2.31	58
204	527515	5168530	12.0	42.7	6.8	57	23.1	0.09	10.0	0.697	8.09	28	57	12555	82	61	13.74	2.7	1.8	5706	3.96	56
205	528274	5168131	5.0	43.3	6.6	43	22.9	0.11	6.5	0.732	9.37	37	35	19639	48	23	4.36	1.3	0.9	3070	2.19	75
206	531625	5167663	5.0	13.6	6.6	38	23.0	0.07	7.0	0.519	17.58	44	41	27937	89	33	5.46	1.1	1.1	2179	2.82	66
207	530731	5166850	4.0	43.3	6.5	42	23.1	0.15	7.2	0.838	17.56	30	59	20136	45	55	9.44	1.6	1.3	5756	2.22	69
208	532558	5165976	14.0	20.5	6.5	37	22.5	0.09	4.0	0.426	11.25	41	36	30779	92	32	7.17	0.9	1.0	1611	2.19	70
209	533507	5164499	1.0	NS	6.2	35	23.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
210	534655	5164860	1.0	36.9	6.1	43	22.4	0.21	33.0	2.510	91.51	38	135	20793	106	312	100.06	5.4	7.1	6934	4.17	159
211	534996	5165107	1.0	NS	5.2	23	23.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
212	536400	5165532	1.0	52.3	5.7	31	23.3	0.08	4.1	0.587	5.08	18	55	3358	51	53	8.65	2.9	1.8	3901	1.78	19
213	536022	5166404	1.0	85.0	5.5	25	23.7	0.12	5.5	0.910	7.95	11	59	3101	57	70	11.49	INF	INF	5886	1.94	37
214	536684	5164722	4.0	37.1	5.7	36	20.7	0.13	20.0	1.980	26.61	34	86	19289	77	101	33.86	3.1	2.0	6619	1.87	106
215	537395	5164725	1.0	41.6	5.6	38	24.1	0.10	15.0	1.442	27.86	28	73	15202	70	89	25.91	2.5	2.4	8444	2.43	100
216	537722	5164307	1.0	30.1	5.9	34	24.0	0.06	11.0	1.067	27.96	48	51	15371	52	72	16.58	1.9	3.4	5265	1.64	91
217	537345	5162656	1.0	NS	5.1	21	24.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
218	537132	5163176	1.0	NS	5.3	22	24.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
219	535038	5163146	7.0	53.6	5.5	26	23.0	0.14	3.2	0.610	4.64	19	58	8698	70	25	4.35	1.0	<0.3	4498	2.32	58
220	534171	5162459	4.0	45.0	5.3	26	22.9	0.12	2.9	0.497	4.56	20	41	7476	71	22	4.63	1.2	0.8	2919	1.36	46
221	534197	5163347	1.0	NS	5.4	28	24.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
222	533786	5163166	1.0	42.4	5.9	37	24.8	0.16	5.2	0.484	8.32	34	68	8703	80	46	7.89	1.8	0.9	2656	19.9	19
223	531527	5164209	1.0	NS	5.7	27	23.8	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
224	526731	5164562	2.0	47.8	5.6	29	23.2	0.04	4.0	0.563	2.82	10	44	2833	39	35	5.77	1.6	1.4	4410	1.23	21
225	523784	5165917	1.0	NS	6.0	47	24.9	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
226	523239	5166627	1.0	82.2	5.8	42	23.7	0.42	229.0	4.013	59.34	27	473	24841	48	1105	68.72	9.2	5.1	18632	1.26	226
227	522539	5166289	1.0	40.6	5.9	32	25.0	0.17	7.1	0.553	5.15	21	68	4981	42	82	10.84	2.5	1.6	3387	3.42	20
228	520385	5166793	1.0	NS	6.1	34	24.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
229	519572	5167148	2.0	49.9	5.9	39	20.8	0.06	4.2	0.394	1.52	<4	46	956	39	27	4.65	2.7	5.2	3473	0.98	37
230	508161	5168979	2.0	53.3	7.7	108	16.3	0.04	6.8	0.720	5.76	25	31	13396	45	31	4.77	1.3	1.0	5313	1.46	80
231	508604	5170333	1.0	77.4	7.3	52	17.0	0.89	INF	3.219	28.63	19	635	11619	67	800	111.14	INF	INF	19504	0.54	154
232	509382	5170760	5.0	60.9	6.3	21	18.3	0.13	3.0	1.047	2.97	13	44	6434	44	26	6.90	0.6	0.7	4777	0.8	130
233	509269	5171387	1.0	90.9	6.0	22	18.1	0.17	6.2	0.605	4.43	5	66	2239	39	77	13.75	2.8	2.1	4985	1.41	23
234	508968	5172513	9.0	45.4	6.0	20	19.0	0.20	11.0	0.827	7.26	21	92	11597	86	98	14.65	3.7	5.1	5646	0.84	70
235	508611	5172805	7.0	65.4	5.3	24	18.1	0.06	3.1	0.645	3.86	6	45	14652	45	17	3.10	<0.3	<0.3	8560	0.8	96
236	508524	5173310	1.0	81.0	5.3	27	16.6	0.12	19.0	1.126	6.14	7	79	7669	52	106	19.04	2.4	1.8	5963	0.8	55
237	508298	5174255	11.0	34.9	5.2	22	19.7	0.07	4.9	0.818	8.38	31	35	13407	97	29	6.66	1.0	1.0	2725	1.78	85
238	509586	5174731	1.1	41.8	5.7	24	19.0	0.06	3.4	0.809	4.91	18	74	6989	42	92	11.20	2.5	2.6	5549	0.98	36
239	509477	5175012	4.0	51.3	5.6	27	18.8	0.08	3.5	0.837	9.94	43	124	20214	54	171	4.91	INF	INF	5864	2.13	97
240	510140	5175766	NM	49.3	5.8	28	19.3	0.14	4.1	0.902	11.85	41	124	7095	64	136	8.60	3.2	1.9	4541	0.84	81
241	511692	5175483	12.0	12.9	6.0	45	15.3	0.05	6.5	0.271	13.40	62	32	30557	239	39	6.70	1.1	1.1	759	4.52	89
242	513099	5176771	13.0	<10	6.0	41	10.3	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
243	511217	5176421	7.0	65.1	5.9	24	15.8	0.07	4.4	0.738	6.30	18	49	7184	41	24	6.50	0.8	0.8	6114	1.07	74
244	509782	5176264	39.0	31.8	6.2	29	20.5	0.16	8.0	0.666	18.37	56	130	24285	103	120	11.57	3.2	2.5	3991	1.42	84
245	509977	5177040	16.0	30.4	6.1	29	20.1	0.12	6.5	0.589	11.43	51	115	23499	104	123	11.33	3.1	3.2	3245	1.2	87
246	509522	5176978	6.0	64.7	6.1	27	20.3	0.07	4.9	0.834	10.32	12	45	7245	43	41	11.12	2.6	1.0	7238	0.79	78
247	509305	5177339	13.0	50.0	6.1	60	20.3	0.13	5.9	0.736	27.28	31	42	35241	106	38	8.51	0.7	0.7	3649	1.72	87
248	508787	5177380	3.0	50.2	6.0	33	19.6	0.04	4.7	0.581	2.48	7	21	5607	38	24	3.11	INF	INF	3244	1.7	39
249	508146	5178446	5.0	74.8	4.8	30	19.0	0.03	2.9	1.057	2.40	10	21	5134	34	13	3.11	0.6	<0.3	4884	0.74	107
250	509454	5178278	17.0	NS	5.3	66	19.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
251	511172	5177539	18.0	61.6	5.5	25	19.8	0.07	4.7	0.753	13.10	23	49	16669	44	31	10.27	1.2	1.0	6015	0.75	87
252	511209	5178372	3.0	58.3	5.6	35	19.2	0.05	3.2	0.641	6.73	13	62	3481	39	19	3.70	1.0	0.7	7310	1.88	87

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method——>		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit——>			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units——>		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
253	509889	5182187	3.0	51.4	5.6	43	18.5	0.03	1.5	0.516	3.91	36	66	5689	54	22	1.95	1.2	<0.3	4331	0.98	76
254	510676	5181816	1.0	51.7	5.6	46	17.2	0.17	4.4	1.153	5.88	37	154	5429	26	32	11.63	3.9	2.0	5441	17.5	48
255	509816	5183821	11.0	61.2	5.9	31	18.8	0.09	4.2	0.605	5.89	43	46	13181	47	27	4.59	1.0	0.8	4724	1.5	77
256	512728	5184051	13.0	50.5	6.2	63	19.7	0.34	25.0	1.147	11.46	30	152	8026	39	32	7.24	6.4	3.4	5784	9.01	107
257	511173	5184456	9.0	64.6	6.2	49	19.7	0.19	18.0	1.062	16.25	27	95	42447	43	34	15.50	INF	INF	17510	6.56	158
258	511305	5185200	2.0	61.5	6.3	53	19.4	0.08	7.3	0.463	5.66	12	52	6243	33	16	3.92	2.6	0.8	11098	3.82	61
259	511457	5185652	2.0	56.5	6.4	102	19.1	0.16	5.2	0.697	2.20	10	112	3449	32	19	3.19	2.2	0.8	10927	3.9	54
260	511426	5185870	3.0	68.6	6.4	81	18.8	0.11	3.7	0.481	4.20	11	33	6315	43	10	2.37	3.0	0.9	8019	6.77	63
261	512733	5184033	13.0	50.8	6.4	65	20.1	0.37	46.0	1.510	25.78	34	164	12071	51	35	8.21	7.3	3.1	10875	10.6	139
262	512659	5184681	3.0	61.5	6.3	37	18.5	0.05	4.5	0.668	4.72	12	36	3182	30	15	2.73	0.9	<0.3	5154	3.84	59
263	513272	5184931	7.0	49.8	6.2	55	19.5	0.19	INF	1.006	12.31	24	103	20787	39	34	9.11	INF	INF	14166	8.35	105
264	514010	5184476	1.0	65.7	6.3	50	18.9	<0.02	2.5	0.360	1.92	6	26	1991	26	12	3.79	1.0	<0.3	5581	3.57	11
265	514106	5183782	2.0	70.0	6.3	72	18.6	<0.02	1.9	0.344	3.38	9	29	2861	33	9	1.51	INF	INF	7306	3.36	55
266	513729	5183484	4.0	67.3	6.4	96	19.3	<0.02	13.0	0.608	3.77	8	44	7714	30	21	7.24	2.3	1.4	11059	1.2	79
267	513591	5182578	5.0	62.6	6.4	54	18.9	<0.02	3.2	0.447	5.46	11	24	1832	33	24	2.73	0.7	0.6	5031	2.41	39
268	514447	5181438	7.0	74.0	6.2	35	19.2	<0.02	6.7	0.557	4.94	8	22	4748	41	17	2.82	INF	INF	9165	0.95	61
269	514613	5183078	1.0	35.3	6.2	32	17.1	0.02	1.8	0.311	2.13	18	53	4763	32	17	6.24	1.8	1.3	2169	3.48	10
270	517081	5185007	6.0	52.8	5.8	23	19.1	0.03	2.4	0.598	2.50	11	25	5485	42	12	2.72	INF	INF	4502	1.09	53
271	517758	5185547	10.0	54.6	4.8	20	17.9	0.02	4.0	0.767	3.16	17	30	5223	58	17	4.36	<0.3	<0.3	4053	1.22	76
272	520022	5185013	5.0	58.0	5.2	32	18.3	0.08	3.2	0.764	2.99	16	51	10951	41	15	3.69	<0.3	<0.3	5213	1.5	71
273	518711	5187345	1.0	NS	5.1	27	17.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
274	516606	5188306	9.0	64.7	5.1	26	19.1	0.20	8.0	1.047	4.84	20	73	5668	56	70	23.00	2.9	3.6	5885	1.3	99
275	515668	5186942	6.0	43.5	4.1	26	20.0	0.03	5.9	0.744	8.12	25	21	9946	37	21	3.76	0.7	2.0	3508	3.23	53
276	515788	5186070	14.0	54.2	4.2	22	20.4	0.09	5.8	0.828	17.10	27	40	21565	63	24	4.13	<0.3	0.8	6799	3.12	79
277	514643	5185403	15.0	48.1	4.3	22	20.2	0.06	4.6	0.616	37.72	27	46	23268	49	25	5.54	0.8	1.5	5636	3.12	65
278	514829	5185946	7.0	42.3	4.4	22	20.4	0.06	3.4	0.565	10.78	19	31	9776	34	20	5.21	<0.3	<0.3	3414	2.46	53
279	514247	5186730	14.0	46.1	4.3	23	20.5	0.11	5.7	0.548	16.49	22	55	18294	55	22	13.63	INF	INF	4686	2.78	55
280	514443	5187663	1.0	NS	4.2	20	19.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
281	513205	5187598	8.0	38.4	3.6	28	20.0	0.06	2.9	0.516	4.63	20	27	9120	52	14	4.03	<0.3	0.7	2706	1.99	42
282	512773	5188098	1.0	31.9	3.6	29	19.0	0.03	1.7	0.312	2.73	17	23	3257	40	18	4.58	INF	INF	2314	3.08	10
283	512538	5188421	12.0	47.8	3.8	26	20.0	0.10	3.9	0.493	12.08	28	51	14830	41	20	7.47	0.8	1.4	4487	4.18	49
284	514086	5188852	5.0	33.9	4.0	24	18.9	0.08	3.8	0.441	5.65	13	53	6657	35	12	1.99	INF	INF	3166	1.28	44
285	513870	5189204	4.0	60.4	4.6	26	18.1	0.19	10.0	0.696	21.90	10	107	15322	41	13	2.62	<0.3	<0.3	9174	1.24	96
286	513732	5189290	5.0	56.2	4.8	25	18.4	0.16	17.0	0.618	17.44	15	102	15232	55	17	3.88	1.2	0.6	5894	1.49	81
287	509489	5185276	4.0	65.7	5.1	30	19.1	0.08	3.4	0.561	8.01	31	57	3667	38	34	3.54	1.3	0.9	5193	2.13	67
288	508916	5185727	10.0	61.1	5.0	23	20.1	0.19	4.3	0.619	9.49	22	55	14536	76	23	5.85	0.5	1.4	9883	2.72	67
289	510297	5186108	2.0	75.9	5.4	97	19.6	0.09	INF	0.746	4.07	19	52	3087	31	20	2.99	INF	INF	7579	3.24	79
290	510421	5186443	1.0	84.3	5.8	87	19.3	0.08	5.3	0.745	3.52	6	40	1505	32	31	10.21	INF	INF	7876	1.02	87
291	507871	5185917	NM	65.3	6.0	31	19.7	0.08	3.9	0.581	9.54	58	52	6102	45	41	4.40	1.3	1.0	5577	2.1	75
292	508440	5186559	3.0	56.8	6.0	43	20.3	0.09	2.5	0.782	8.49	27	47	8120	46	30	8.23	INF	INF	8188	7.36	65
293	509377	5187601	3.0	63.9	6.0	26	18.8	0.08	2.6	0.608	2.63	9	42	5477	37	11	3.83	<0.3	<0.3	3914	2.1	33
294	508139	5188143	4.0	57.8	5.6	26	18.7	0.12	5.9	0.528	7.10	27	46	15467	45	24	10.09	1.2	0.7	4557	2.28	85
295	506722	5188460	11.0	65.9	5.9	32	19.8	0.09	4.2	1.053	7.55	17	37	7944	47	21	9.91	1.1	0.7	5969	1.9	96
296	508871	5189322	2.0	65.5	5.9	22	19.7	0.06	3.9	0.637	7.34	21	36	25269	57	16	4.53	INF	INF	5511	1.76	82
297	509493	5188165	4.0	57.0	5.8	20	19.2	0.14	2.5	0.593	2.33	10	36	4408	31	9	5.47	INF	INF	3444	1.23	30
298	510354	5188081	2.0	68.3	5.4	20	19.4	0.06	2.3	0.514	3.64	11	23	4148	36	13	3.06	INF	INF	4723	3.35	40
299	512081	5186983	1.0	39.5	5.6	23	20.0	0.07	2.6	0.563	5.96	25	27	12482	51	19	6.02	INF	INF	2015	7.32	48
300	511900	5188226	7.0	37.3	5.6	24	20.5	0.19	INF	1.266	13.24	32	45	21777	48	33	21.66	INF	INF	3493	7	92
301	510444	5189379	3.0	60.0	5.7	30	20.7	0.10	4.6	0.695	6.15	20	33	26966	57	18	8.64	1.6	1.1	7888	4.77	80
302	510690	5190237	1.0	NS	5.8	28	20.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
303	509023	5191661	5.0	32.6	5.7	25	20.1	0.18	2.6	0.411	7.53	34	53	15566	84	22	5.75	1.3	1.1	2641	4.26	54
304	510426	5191800	23.0	31.0	5.5	22	20.2	0.21	6.1	0.771	11.58	40	47	22745	120	29	20.70	1.3	4.3	3538	7.87	83
305	510605	5192621	6.0	20.9	5.5	23	20.1	0.06	2.3	0.558	13.17	25	21	11226	103	19	4.46	INF	INF	1685	2.06	53
306	511877	5190704	5.0	48.0	4.6	26	20.3	0.08	3.4	0.652	18.07	22	74	7342	34	28	4.94	1.3	1.0	3684	3.71	68
307	512048	5191914	6.0	56.3	4.4	23	20.3	0.16	7.4	1.036	12.72	11	60	12073	47	46	25.24	1.5	1.2	9908	1.77	72
308	512336	5191426	2.0	56.1	4.3	23	20.2	0.06	3.7	0.580	9.46	11	56	4425	47	30	6.14	0.7	1.0	4798	1.88	52
309	512995	5190595	10.0	40.1	4.5	20	20.0	0.06	4.8	0.566	14.76	22	78	12014	56	23	4.29	0.8	0.7	3167	2.93	72
310	513940	5189944	3.0	60.7	5.1	33	20.0	0.07	16.0	0.651	9.51	9	84	5053	29	8	2.28	1.0	<0.3	7667	2.73	72
311	515138	5191605	17.0	42.1	5.4	30	19.9	0.23	7.3	0.653	42.10	47	65	53235	63	25	10.56	1.7	1.4	4488	4.17	99
312	515879	5190442	22.0	32.7	5.5	25	19.9	0.17	3.9	0.587	7.89	37	64	14304	53	19	8.62	1.3	1.1	2295	4.64	67
313	516503	5189822	7.0	61.0	5.5	24	19.7	0.05	4.0	0.752	10.04	16	43	7019	34	16	2.99	1.0	0.7	7707	5.15	77
314	517154	5191688	1.0	56.2	5.4	24	18.5	<0.02	2.0	0.405	1.76	4	39	1658	30	13	3.30	<0.3	<0.3	3633	1.82	28
315	516397	5192538	14.0	57.5	5.1	25	19.4	0.14	5.3	0.575	14.46	16	72	14119	45	20	8.28	INF	INF	5783	3.04	67
316	516530	5191757	2.0	59.8	5.3	27	20.0	0.06	2.4	0.399	7.07	5	50	1721	37	18	2.78	INF	INF	6093	3.1	47
317	515930	5192304	2.0	46.5	5.3	25	20.0	0.08	3.4	0.549	11.25	24	42	10016	48	24	4.77	0.9	0.6	3369	2.7	66
318	514474	5191934	1.0	33.5	5.4	25	19.3	0.11	3.4	0.532	12.48	25	52	9309	49	25	9.12	INF	INF	4686	5.45	49
319	513278	5192324	7.0	59.7	5.3	26	19.8	0.16	4.5	0.927	7.51	13	73	7105	37	14	5.09	1.9	0.8	9455	5.53	91
320	512974	5193676	1.0	67.3	5.6	32	19.5	0.09	3.5	0.740	3.06	6	39	3102	41	38	16.91	2.7	2.0	7168	1.99	28
321	513679	5193156	5.0	63.8	5.3	27	19.2	0.14	2.8	0.597	2.19	6	56	3405	31	14	3.47	INF	INF	5291	1.76	62
322	514717	5192844	3.0	71.8	5.1	23	20.0	0.07	2.5	0.469	3.31	10	19	5814	37	8	3.66	INF	INF	4539	0.86	70
323	515306	5192567	8.0	51.3	5.2	25	20.7	0.14	4.6	0.674	8.74	25	53	9455	62	38	15.13	1.7	1.5	6169	3.74	63
324	518177	5193244	4.0	66.8	4.9	21	20.2	0.05	INF	0.517	6.26	13	27	5174	41	13	2.00	INF	INF	3925	0.67	63
325	517324	5193512	2.0	42.5	4.1	29	20.3	0.11	5.6	0.569	7.72	19	41	8362	46	43	12.79	1.5	1.1	6653	1.64	50
326	517629	5194828	1.0	38.1	NM	NM	NM	0.10	2.8	0.471	4.26	14	43	3432	47	31	11.53	1.2	1.0	3836	3.16	20
327	516739	5194833	3.0	49.7	4.7	27	21.2	0.09	5.0	0.806	20.82	29	42	25010	50	27	5.68	1.0	0.9	3091	3.56	111
328	515826	5194464	10.0	44.7	5.0	27	21.1	0.13	4.7	0.678	8.39	29	43	10843	75	26	13.64	1.2	1.1	3989	2.23	72
329	515110	5194842	4.0	55.1	4.8	24	20.9	0.09	2.0	0.526	8.42	17	40	2340	35	26	6.29	INF	INF	5008	2.24	86
330	514156	5193808	1.0	38.5	4.8	24	20.3	0.10	INF	0.434	6.90	20	37	9068	43	26	10.23	INF	INF	8025	2.63	42
331	513798	5194369	1.0	31.3	4.7	23	21.6	0.18	10.0	0.624	9.76	27	58	13956	53	54	33.87	INF	INF	2962	2.1	42
332	512463	5195664	3.0	48.4	5.5	55	20.5	0.10	1.8	0.456	5.30	13	34	2941	24	23	2.97	0.7	<0.3	6025	3.82	48
333	511032	5194980	18.0	57.3	4.8	21	20.9	0.20	4.3	0.796	7.82	34	61	7448	49	19	7.34	1.2	1.4	4702	4.05	61
334	511059	5194415	7.0	64.0	4.9	19	20.1	0.12	3.2	0.852	5.45	13	40	8982	48	15	3.92	INF	INF	5224	1.11	96
335	510124	5193405	2.0	37.6	4.4	24	20.6	0.06	1.6	0.326	3.55	13	25	3656	25	18	3.33	INF	INF	3013	2.24	23
336	509054	5193340	12.0	35.8	4.9	23	21.2	0.16	3.5	1.922	26.49	40	45	31402	85	27	11.07	INF	INF	2484	11.9	149

Site Number	Easting	Northing	Lake Depth	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
	Method---------------->			Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit------->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units---------------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
337	507425	5191368	2.0	61.5	5.4	47	19.8	0.06	1.4	0.808	8.56	10	35	3828	28	20	2.90	<0.3	<0.3	6698	1.85	100
338	507950	5190048	1.0	52.1	5.5	35	22.0	0.08	2.5	0.997	6.30	13	23	4540	24	23	9.86	INF	INF	3955	2.22	66
339	508501	5190567	1.0	NS	5.9	38	22.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
340	505895	5189071	1.0	46.8	5.7	32	21.8	0.12	4.7	1.129	12.86	23	46	7875	49	52	20.72	1.4	2.8	4354	1.66	66
341	508590	5183834	1.0	20.2	5.6	29	21.1	0.06	4.5	0.526	4.79	20	27	6157	63	46	9.73	1.3	2.1	2746	0.62	30
342	507785	5177985	4.0	52.7	4.0	24	21.2	0.08	4.0	0.740	4.99	18	30	7339	59	25	5.81	0.7	0.8	3616	1	52
343	507687	5177345	10.0	58.7	3.8	28	20.9	0.09	2.2	0.654	2.88	12	27	4002	36	17	3.95	<0.3	<0.3	3486	0.78	42
344	507989	5175642	1.0	14.7	3.7	19	18.6	0.07	2.6	0.359	4.22	20	14	8881	55	25	15.87	<0.3	0.7	1305	1.39	34
345	508482	5171194	7.0	65.4	3.4	24	20.6	0.13	2.4	0.802	3.87	17	43	7294	36	29	4.95	0.8	0.7	5227	0.82	103
346	508884	5171318	7.0	63.8	4.0	24	21.4	0.11	3.4	1.137	13.85	27	68	5016	43	42	3.55	INF	INF	6743	1.81	118
347	525992	5173917	30.0	14.4	7.7	58	17.9	0.12	14.0	0.522	14.63	60	39	47206	336	40	6.94	1.1	1.0	841	4.1	87
348	527701	5175823	1.0	NS	6.8	25	18.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
349	528034	5175187	2.0	49.3	6.3	22	18.7	0.07	1.8	0.529	3.44	25	29	4150	33	20	4.36	0.8	<0.3	3118	1.62	32
350	528980	5174881	8.0	33.9	6.0	25	19.3	0.08	3.8	0.576	8.99	34	34	13656	92	28	4.97	INF	INF	2770	1.51	64
351	528929	5176632	8.0	38.5	6.2	26	18.9	0.11	5.5	0.939	20.60	42	41	21175	100	35	7.25	1.3	1.3	3384	3.04	99
352	528979	5177278	9.0	63.7	6.6	53	19.0	0.13	5.0	0.770	7.98	19	62	10490	72	47	15.30	INF	INF	6991	1.95	71
353	529875	5177206	17.0	34.5	6.6	28	19.2	0.16	8.3	1.022	44.85	40	42	50872	116	43	9.82	1.4	1.1	2587	2.61	112
354	528331	5177849	24.0	NS	6.9	57	18.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
355	526833	5177307	12.0	<10	7.0	61	18.2	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
356	526104	5179178	6.0	NS	6.9	46	19.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
357	525612	5180864	13.0	16.7	6.9	43	19.9	0.11	INF	0.422	14.05	61	33	24599	250	40	7.50	INF	INF	1136	1.75	86
358	525126	5182260	4.0	22.9	6.8	41	19.3	0.06	2.4	0.333	8.45	36	29	11907	160	25	4.16	0.8	0.7	1783	1.3	57
359	524422	5182645	10.0	67.1	6.6	32	19.2	0.08	2.6	0.594	7.65	9	32	11243	45	26	5.24	1.9	3.0	6785	0.53	84
360	524453	5183137	2.0	60.7	6.2	29	19.6	0.09	2.5	0.633	7.85	15	32	3952	54	21	2.71	<0.3	<0.3	6370	1.32	70
361	524996	5183540	5.0	40.0	5.2	29	19.6	0.08	INF	0.860	10.00	31	40	11657	54	30	7.18	INF	INF	2918	1.99	78
362	525191	5184721	9.0	66.4	4.6	27	19.0	0.09	2.5	0.858	3.06	14	27	5233	48	15	3.70	<0.3	<0.3	4318	1.42	59
363	525529	5185724	2.0	56.2	4.3	27	18.8	0.08	INF	0.804	5.52	10	32	3553	47	33	8.91	INF	INF	4932	4.08	50
364	525214	5186189	2.0	44.1	4.5	28	19.7	0.10	2.3	0.736	7.70	24	30	7467	52	19	6.68	INF	INF	3788	2.49	64
365	525169	5187548	4.0	40.8	3.8	38	19.5	0.07	INF	0.381	1.75	19	44	1479	30	23	2.62	0.9	1.1	3683	3.91	24
366	524495	5187877	6.0	68.5	3.8	29	20.0	0.10	5.8	0.762	4.81	13	37	8387	38	22	6.63	INF	INF	5573	3.83	65
367	524469	5188364	15.0	54.3	3.6	35	19.6	0.12	4.4	1.290	6.86	23	42	8528	42	29	9.32	INF	INF	5375	3.8	93
368	522843	5188608	1.0	17.8	3.6	31	18.0	0.07	2.6	0.467	2.52	9	37	777	47	32	16.94	0.8	0.7	1399	1.68	16
369	519287	5189072	2.0	31.3	4.5	27	18.3	0.09	5.6	0.436	7.93	31	43	6733	62	20	7.88	1.1	0.9	2604	2.13	79
370	519540	5190981	10.0	43.3	4.0	24	19.2	0.06	2.0	0.682	4.08	20	23	5409	42	15	3.92	INF	INF	3140	1.61	41
371	518707	5191529	0.1	31.2	3.7	23	17.8	0.05	<0.5	0.343	4.36	22	19	4164	42	25	4.76	<0.3	<0.3	2151	2.88	22
372	517827	5197118	11.0	52.8	5.1	28	19.2	0.19	17.0	1.328	6.30	26	61	24480	74	39	37.97	INF	INF	10158	1.64	100
373	518546	5197238	4.0	31.0	5.4	39	19.5	0.09	5.9	0.651	18.66	59	32	51134	75	35	6.46	1.2	1.3	2982	2.12	95
374	518952	5197528	11.0	37.8	5.3	26	19.4	0.11	3.9	0.711	24.03	46	31	22959	60	23	5.62	1.2	2.0	2362	2.03	68
375	519863	5198930	10.0	24.3	4.8	26	19.3	0.05	3.2	0.530	27.26	43	30	16729	96	26	5.21	1.1	1.0	1860	2.48	57
376	519015	5198864	2.0	79.5	4.2	15	19.4	0.11	2.5	0.964	7.70	18	22	4377	38	14	4.63	INF	INF	2822	0.51	137
377	518338	5198936	18.0	29.6	5.2	30	19.8	0.18	22.0	0.992	62.41	57	58	148188	78	40	8.29	2.3	1.8	1347	7.36	136
378	518650	5200932	20.0	18.6	5.6	32	18.9	0.11	6.5	0.562	17.20	34	36	18636	100	26	15.69	1.2	1.7	2803	2.78	50
379	518547	5202373	2.0	<10	5.5	28	18.6	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
380	519309	5204223	1.0	40.9	5.0	50	18.2	0.10	2.0	0.409	3.33	26	32	5942	63	16	6.41	INF	INF	3394	1.43	54
381	517633	5202653	34.0	23.6	5.5	28	19.4	0.14	7.9	0.744	20.03	45	48	43878	165	31	11.37	1.2	1.3	2183	2.89	86
382	517298	5203960	NM	NS	5.4	28	19.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
383	515795	5203188	9.0	40.2	5.5	27	19.4	0.14	2.4	0.478	7.34	29	44	10045	80	21	9.73	0.9	0.9	4334	3.14	54
384	515007	5204547	15.0	37.7	5.4	27	19.5	0.18	2.8	0.476	10.21	29	46	13460	79	20	8.64	1.0	1.8	3372	2.1	53
385	514162	5204153	2.0	40.4	5.1	25	19.1	0.10	2.1	0.491	6.39	25	39	9254	56	21	4.22	0.9	0.8	2863	1.85	47
386	514287	5203450	1.0	56.1	5.4	29	16.6	0.07	1.5	0.440	2.80	11	35	2599	45	18	4.67	1.0	0.7	4743	3.27	18
387	512864	5204090	9.0	39.4	5.5	25	18.4	0.16	2.6	0.585	6.50	36	50	9770	56	18	5.65	0.9	0.9	2998	2.68	61
388	511339	5205082	2.0	43.7	4.5	25	17.4	0.12	3.2	0.703	5.05	19	32	6700	51	27	12.52	0.9	1.8	4569	2.09	31
389	511644	5204548	5.0	48.5	4.1	26	17.3	0.15	1.3	0.504	2.76	15	28	5501	48	16	4.64	<0.3	<0.3	3201	1.52	37
390	511765	5203641	2.0	55.6	3.9	29	18.5	0.11	1.8	0.576	6.98	23	38	4550	42	25	4.44	<0.3	<0.3	3387	1.89	54
391	511217	5203563	3.0	50.0	4.0	22	19.0	0.11	2.0	0.857	11.86	36	45	12366	41	30	4.44	0.9	0.8	3833	2.63	82
392	509277	5203833	1.0	31.0	4.4	21	17.4	0.05	<0.5	0.260	2.68	12	21	3830	61	12	6.30	<0.3	0.8	2327	34.1	21
393	509340	5203129	1.0	31.9	4.7	26	16.6	0.04	0.8	0.342	2.40	7	30	2257	56	14	5.09	<0.3	<0.3	3036	17.4	12
394	510290	5201870	1.0	52.9	5.6	88	17.9	0.08	4.0	0.690	3.03	11	21	4336	32	14	8.57	0.7	<0.3	8084	3.19	74
395	511360	5202375	8.0	52.0	5.7	33	18.9	0.22	2.3	0.639	6.78	25	59	5573	53	20	5.51	1.0	0.8	5490	3.73	69
396	512374	5201727	10.7	54.6	5.4	29	19.5	0.25	3.1	0.683	16.00	27	59	14122	59	24	10.59	0.9	0.8	5878	2.98	75
397	512571	5202096	8.0	50.7	5.1	28	19.0	0.23	3.0	0.648	5.22	19	59	7017	55	19	6.19	0.9	0.6	5703	2.18	61
398	513696	5202440	3.0	46.9	4.3	27	17.4	0.09	3.0	0.557	2.67	4	27	1526	39	11	7.52	<0.3	<0.3	3788	1.28	27
399	515009	5201459	2.0	39.1	4.3	30	18.2	0.11	0.9	0.367	2.32	19	42	3241	42	18	5.28	INF	INF	3962	4.35	23
400	514585	5200636	4.0	54.6	4.2	26	18.9	0.13	1.9	0.743	4.95	20	37	3162	47	21	6.36	<0.3	<0.3	4551	1.82	75
401	515145	5199545	7.0	53.2	3.9	28	18.4	0.15	2.7	0.744	5.45	27	31	6983	46	15	8.39	<0.3	<0.3	3275	1.59	65
402	516104	5200084	25.0	39.2	4.5	25	19.2	0.20	4.8	0.783	9.20	43	55	16055	55	26	13.30	1.3	1.3	3229	2.57	77
403	516221	5197854	21.0	36.7	4.5	25	19.3	0.18	3.7	0.487	7.96	39	49	10650	79	23	11.96	1.0	1.1	3067	2.26	58
404	514409	5198038	7.0	64.5	3.7	34	17.8	0.14	2.0	0.595	3.68	12	31	3719	52	13	4.75	<0.3	1.3	3788	1.08	61
405	514091	5197180	5.0	54.5	3.7	38	18.3	0.09	1.5	0.510	2.81	16	34	4434	40	16	5.05	<0.3	<0.3	3857	1.28	40
406	514871	5195729	1.0	37.6	4.6	22	18.2	0.08	2.8	0.275	3.15	25	23	3835	35	14	4.29	0.7	<0.3	3349	2.75	41
407	517038	5196143	48.0	45.4	4.4	28	19.3	0.07	3.8	0.481	8.61	23	29	7815	56	19	6.38	0.6	1.1	2619	2.14	46
408	516189	5196475	11.0	28.3	4.5	25	19.3	0.11	4.9	0.527	13.63	42	35	29002	62	27	6.35	1.0	1.0	2003	2.52	84
409	515091	5196339	3.0	39.0	3.9	28	19.7	0.09	2.9	0.631	9.12	26	33	12495	41	29	7.83	0.7	0.9	2810	2	100
410	513356	5196261	1.0	33.2	3.9	27	18.5	0.11	1.4	0.269	3.39	19	26	3648	53	20	7.73	<0.3	<0.3	1743	3.17	19
411	512111	5197745	1.0	NS	5.8	56	17.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
412	511030	5199367	7.0	40.5	5.5	23	20.1	0.19	2.0	0.782	11.70	26	44	8001	45	27	20.67	0.6	0.7	4149	4.31	79
413	511748	5200430	2.0	50.3	6.0	71	19.6	0.15	5.0	0.870	4.40	22	46	6040	35	31	8.17	1.2	<0.3	9284	4.01	86
414	510733	5200851	27.6	53.7	6.4	50	20.5	0.29	6.9	1.397	14.85	52	78	33871	58	37	16.83	2.0	1.4	4890	6.91	172
415	509342	5199921	5.0	37.9	5.7	22	19.3	0.11	2.5	0.376	6.38	31	29	8738	62	18	9.88	<0.3	0.8	2070	16	44
416	509049	5199364	4.0	43.9	4.9	25	18.9	0.09	1.5	0.528	4.76	28	28	6979	169	16	10.80	0.7	0.7	2551	19.3	45
417	508398	5199696	1.0	47.6	5.1	23	18.5	0.07	1.5	0.398	3.50	12	23	4292	46	18	14.65	0.7	1.4	3324	33.9	17
418	508069	5200214	1.0	38.1	4.9	28	18.6	0.08	1.2	0.214	1.14	11	21	2517	51	15	11.47	<0.3	<0.3	2135	23.7	7
419	508094	5201092	1.0	35.8	4.9	23	18.4	0.07	1.2	0.527	3.31	16	22	4492	53	16	20.48	<0.3	<0.3	2457	52.7	22
420	507386	5201621	13.0	35.2	5.2	24	19.7	0.16	3.4	1.100	11.09	33	47	38306	72	23	17.97	1.4	2.0	2334	74.4	130

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method--------------->		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit ------->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units--------------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
421	506631	5200856	12.0	34.9	5.2	23	19.4	0.09	2.0	0.586	4.28	25	33	11482	68	15	12.26	0.6	1.0	2424	48.6	62
422	506543	5201631	8.0	30.5	5.3	24	19.7	0.08	2.4	0.479	5.44	24	29	18162	62	17	10.46	0.8	<0.3	2195	46.6	72
423	506720	5203123	NM	33.4	4.6	28	19.3	0.08	1.6	0.257	0.98	11	28	2279	33	13	6.82	<0.3	<0.3	2661	57.8	8
424	507832	5203987	3.0	64.2	4.3	25	19.3	0.06	1.5	0.699	9.73	14	22	3825	59	16	5.73	<0.3	<0.3	3929	26.9	69
425	507159	5204382	10.0	43.0	4.8	21	19.5	0.09	2.0	0.861	6.46	29	33	9590	59	19	17.09	<0.3	0.6	3121	47.8	82
426	506456	5204293	9.0	39.5	5.0	21	19.3	0.10	2.7	0.783	6.79	31	32	14194	47	20	15.18	0.5	1.3	3096	52.2	89
427	505465	5203919	4.0	32.8	5.1	26	19.2	0.15	2.5	0.378	8.35	34	37	26626	67	21	10.88	1.0	1.7	2356	36.3	66
428	504846	5203156	1.0	30.2	4.3	25	18.7	0.07	0.5	0.224	1.36	14	21	3172	35	12	13.88	<0.3	0.8	2485	44.2	15
429	505234	5202482	1.0	42.6	4.3	24	18.3	0.11	0.5	0.347	1.29	12	31	3431	36	12	7.53	1.0	2.0	2901	83.6	8
430	505932	5202064	2.0	59.8	4.2	28	18.4	0.08	1.2	0.588	3.91	9	28	1050	46	11	9.10	<0.3	<0.3	4073	89.1	61
431	505196	5201103	5.0	49.9	4.3	24	19.0	0.10	3.1	0.667	7.29	16	32	12684	38	15	6.40	0.6	1.4	3287	29.6	67
432	504195	5202500	3.0	65.3	4.1	23	19.4	0.11	1.7	1.215	4.45	11	29	1744	40	12	12.59	<0.3	<0.3	4101	66.8	110
433	504044	5201976	4.0	48.0	3.9	28	19.0	0.10	1.1	0.399	3.00	15	33	5455	50	17	17.76	<0.3	<0.3	2455	38.7	38
434	504077	5201106	4.0	38.8	4.2	24	18.9	0.12	0.5	0.622	6.11	23	29	13994	41	19	14.03	<0.3	<0.3	2267	41.4	71
435	503765	5200370	2.0	31.1	4.2	21	19.0	0.11	1.6	0.243	0.98	15	29	2218	43	10	10.79	<0.3	<0.3	2937	54.8	9
436	503110	5200193	5.0	53.3	4.3	23	19.1	0.13	2.4	0.618	1.78	11	29	7811	49	13	8.51	0.4	1.3	3686	18	46
437	502948	5201028	2.0	53.6	4.3	23	18.6	0.13	2.1	0.497	4.32	19	36	3372	49	23	6.31	<0.3	<0.3	3493	16.2	32
438	502789	5202124	1.0	41.8	4.4	27	18.3	0.08	1.5	0.343	2.32	12	19	3137	49	16	6.60	0.4	1.4	2637	9.76	18
439	503434	5204878	2.0	49.7	4.3	27	18.5	0.08	0.5	0.485	2.96	10	28	2611	45	16	7.12	0.7	1.5	3608	18.3	42
440	502409	5205036	6.0	12.3	4.9	25	19.3	0.06	1.6	0.306	8.76	29	18	25801	71	18	3.24	0.7	<0.3	1045	7.76	57
441	500582	5205172	2.0	41.8	4.7	25	18.8	0.08	1.2	0.607	3.93	19	22	5859	41	16	4.31	0.4	1.5	2115	12.5	57
442	500644	5203808	1.0	41.9	4.3	20	18.3	0.06	1.1	0.285	1.79	7	19	2478	38	14	5.98	<0.3	<0.3	2532	10.8	22
443	501400	5200769	1.0	46.6	4.2	26	18.6	0.09	2.1	0.655	4.90	21	31	7819	30	17	3.55	<0.3	<0.3	2857	2.76	76
444	500406	5200178	2.0	55.6	4.5	21	18.7	0.11	4.1	0.977	6.89	16	35	8015	44	33	18.74	0.9	0.8	5191	5.15	41
445	501633	5199107	5.0	63.5	4.6	22	14.7	0.11	1.2	0.460	2.46	13	48	3737	74	17	2.60	0.3	1.4	4021	0.92	53
446	501152	5198398	1.0	38.2	4.4	23	17.5	0.07	1.9	0.333	2.47	13	20	3240	43	15	6.05	0.4	1.2	2505	1.32	29
447	500546	5198483	1.0	47.9	4.8	24	18.5	0.10	3.1	0.575	6.16	22	40	6075	59	30	7.65	0.8	<0.3	4207	2.88	44
448	500070	5197319	5.0	51.5	4.2	24	19.5	0.10	1.6	0.558	2.77	20	47	4169	40	15	2.21	1.3	1.7	3866	2.53	55
449	500034	5196529	7.0	28.0	4.7	19	19.8	0.09	2.9	0.500	9.91	43	36	27874	63	27	5.34	1.2	1.1	2070	2.86	86
450	502991	5196600	1.0	33.7	4.6	24	18.9	0.05	0.8	0.185	1.62	10	21	2188	39	14	2.56	<0.3	0.7	2477	2.48	15
451	503547	5197853	5.0	28.7	4.8	23	18.9	0.09	2.8	0.303	10.39	36	30	22453	61	22	3.64	0.8	0.7	2169	2.42	72
452	502921	5199214	12.0	41.7	5.1	24	18.8	0.18	2.3	0.529	9.66	34	40	13750	59	20	9.07	0.8	1.6	2344	8.09	73
453	503959	5199157	4.0	47.0	4.5	28	19.4	0.14	2.1	0.475	5.12	19	50	6815	50	18	7.93	1.0	0.7	5870	83.8	57
454	504780	5198948	2.0	42.5	4.4	24	19.1	0.09	2.3	0.556	5.09	13	28	7384	50	20	14.32	0.8	<0.3	3286	32.9	27
455	505124	5198204	5.0	44.2	4.7	24	19.5	0.14	2.4	0.631	6.50	21	35	14269	59	16	16.25	0.9	1.6	2893	36.1	62
456	505411	5199086	1.0	48.0	4.6	25	18.9	0.08	2.3	0.406	2.98	13	29	5526	61	21	14.83	1.1	0.8	4427	34.5	24
457	506112	5199988	9.0	46.7	5.1	29	19.4	0.10	3.7	0.587	5.04	16	34	7308	76	16	11.58	0.9	0.7	4251	58.1	61
458	506182	5198913	10.0	59.6	4.2	27	17.3	0.17	2.9	0.634	5.45	12	44	9419	65	12	12.73	<0.3	<0.3	4864	16.6	55
459	506614	5198950	10.0	59.1	4.6	21	19.3	0.15	2.7	0.665	7.54	16	49	12799	51	14	9.80	<0.3	<0.3	5026	14.7	61
460	507295	5199021	21.0	58.9	4.8	24	19.5	0.19	2.8	0.655	17.88	20	64	30839	70	16	10.12	0.6	<0.3	7889	12.7	67
461	507016	5198170	3.0	46.1	3.9	27	19.5	0.07	1.9	0.421	4.74	15	24	4426	33	22	5.43	<0.3	<0.3	3187	4.07	36
462	507924	5198585	1.0	37.5	3.9	28	19.3	0.06	1.1	0.217	1.50	11	16	2010	34	13	5.35	0.5	1.7	2186	3.89	12
463	509261	5198369	5.0	47.2	3.8	31	19.4	0.09	1.7	0.557	5.40	27	31	6029	36	24	4.27	0.7	0.8	3701	3.14	41
464	509799	5197247	6.0	39.7	4.0	26	19.8	0.10	2.0	0.469	7.16	23	36	5427	37	16	3.06	0.9	0.9	3533	4.27	42
465	510509	5195395	3.0	47.3	3.9	29	19.6	0.05	1.4	0.520	5.34	13	29	1999	41	20	2.49	0.7	1.0	3774	5.18	35
466	510211	5194370	4.0	53.8	4.0	32	19.5	0.07	2.3	0.668	4.63	16	22	3631	44	22	4.65	<0.3	<0.3	4289	1.04	63
467	508967	5194387	3.0	70.3	3.7	35	20.2	0.08	1.7	0.676	7.68	22	45	2721	32	29	4.55	<0.3	<0.3	3517	1.51	76
468	506775	5192851	2.0	73.5	3.7	21	16.6	0.13	3.9	0.828	2.32	20	48	8316	39	12	3.82	<0.3	0.6	4722	2.84	98
469	506345	5191961	2.0	61.1	4.3	18	18.0	0.10	1.6	0.433	1.65	16	41	11436	50	13	2.86	<0.3	1.2	3720	2.84	45
470	505350	5184172	1.0	53.5	5.1	46	19.3	0.15	2.5	0.683	9.66	26	45	5732	50	23	5.23	0.8	<0.3	5883	1.42	94
471	505983	5181166	1.0	11.8	6.0	76	16.5	0.20	3.5	0.225	6.75	100	146	14700	186	33	5.31	5.1	1.8	1325	8.82	40
472	507009	5177696	9.0	55.6	5.0	21	18.8	0.07	2.8	0.536	2.10	10	31	9732	58	13	3.47	<0.3	<0.3	4364	0.89	57
473	508887	5176405	3.0	58.8	4.6	25	19.3	0.06	1.8	0.673	2.56	9	23	5761	37	19	3.17	<0.3	<0.3	4128	0.84	55
474	508670	5175727	15.0	52.2	4.4	22	20.5	0.08	3.5	0.921	8.03	24	31	7984	47	31	5.69	0.8	0.7	3994	1.56	76
475	531940	5173833	15.0	36.5	7.0	36	19.0	0.10	6.5	0.809	9.21	32	50	24211	78	29	8.23	1.8	1.5	3644	1.57	80
476	531918	5175215	3.0	50.0	6.6	28	19.4	0.08	3.2	0.449	8.78	23	26	15509	52	21	5.10	0.9	0.8	3982	1.37	69
477	530950	5175992	10.0	55.6	6.4	26	19.3	0.07	4.3	0.774	7.09	28	37	11828	54	22	5.03	1.2	0.8	5789	3.65	74
478	528421	5179144	32.0	26.6	6.3	29	19.9	0.12	5.4	0.567	15.04	45	46	16669	229	25	6.43	1.1	1.1	3162	3.17	63
479	527438	5179632	8.0	51.4	6.0	27	19.5	0.10	2.6	0.699	10.82	23	43	10274	49	18	5.87	1.9	3.1	4080	2.59	54
480	526703	5183383	8.0	23.6	6.1	33	19.4	0.08	3.9	0.401	9.79	43	26	17103	156	27	5.21	1.3	2.0	1740	3.61	68
481	526710	5184252	5.0	32.4	5.5	26	18.9	0.05	2.9	0.532	6.08	26	16	8489	112	21	4.74	<0.3	<0.3	2124	2.18	42
482	527880	5184651	2.0	19.0	4.8	27	18.4	0.06	2.2	0.417	12.72	36	23	11148	125	26	4.15	2.0	8.2	1326	3.05	50
483	527192	5186707	7.0	10.2	4.5	27	19.3	0.04	3.4	0.260	13.04	22	27	9592	61	19	3.41	1.1	1.3	1758	3.54	38
484	527019	5187499	10.0	18.5	4.4	27	19.3	0.06	3.0	0.463	16.27	26	20	18602	70	19	4.55	0.8	1.8	1431	2.24	62
485	526266	5187749	1.0	35.6	3.9	32	17.7	0.05	2.8	0.285	6.74	18	30	4234	36	22	4.02	<0.3	<0.3	2849	2.34	16
486	524966	5188738	2.0	37.9	3.7	33	18.8	0.05	1.9	0.424	7.81	18	36	5411	36	15	3.79	<0.3	<0.3	2655	2.39	37
487	525015	5189067	2.0	38.4	3.7	35	18.1	0.05	1.4	0.333	2.13	9	34	1677	34	11	2.68	<0.3	<0.3	2314	1.98	17
488	524275	5189172	12.0	47.1	3.7	32	19.2	0.12	2.3	1.111	8.67	30	59	7215	64	24	6.35	1.0	2.2	3053	4.03	56
489	524532	5189807	3.0	27.1	3.7	35	18.4	0.07	1.5	0.309	4.36	19	29	3324	35	22	3.46	<0.3	<0.3	1963	3.43	35
490	525029	5190061	10.0	33.5	3.9	28	18.9	0.08	3.2	0.422	13.19	34	34	12908	45	24	5.64	0.8	0.6	2573	2.71	63
491	525060	5191538	5.0	32.6	3.8	34	18.7	0.07	2.0	0.591	4.40	20	27	4431	33	15	3.19	<0.3	<0.3	2829	2.71	42
492	524771	5192345	4.0	32.6	4.0	34	19.5	0.08	3.4	0.859	13.04	33	34	18013	38	22	4.20	1.0	1.0	3175	3.95	80
493	525757	5192673	18.0	26.3	4.5	26	19.3	0.08	4.3	0.697	14.34	36	30	31400	76	22	5.63	0.9	1.0	2166	3.03	74
494	528760	5192959	9.0	27.5	3.9	30	19.3	0.10	6.1	0.622	16.56	27	64	11328	63	24	5.90	0.9	2.1	1964	3.33	65
495	529946	5193652	3.0	46.9	3.8	30	18.8	0.08	1.4	0.557	2.63	17	24	3952	37	17	5.40	<0.3	<0.3	2743	1.57	34
496	529703	5192688	6.0	47.6	3.9	27	18.8	0.12	2.6	0.649	3.09	18	26	8634	51	16	5.64	<0.3	<0.3	3634	1.97	56
497	531193	5194032	3.0	NS	4.4	28	18.4	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
498	532395	5194191	7.0	39.9	5.2	31	19.2	0.12	3.2	0.596	6.15	28	41	10091	76	22	6.78	1.0	0.9	3423	2.73	60
499	531952	5193619	6.0	NS	5.4	29	19.6	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
500	532534	5192630	2.0	62.9	5.2	28	18.8	0.11	3.5	0.711	8.21	23	54	5479	51	25	7.92	1.3	1.0	5383	3.75	63
501	533879	5193703	8.0	41.4	5.3	30	19.2	0.12	3.5	0.635	6.15	32	46	9462	62	23	8.00	0.8	0.6	3290	3.19	64
502	533355	5194440	1.0	51.8	5.4	42	17.9	0.08	3.6	0.720	6.66	20	35	6878	72	28	6.48	0.9	1.6	3847	2.05	49
503	532940	5195891	20.0	25.7	5.3	29	19.3	0.11	3.1	0.613	12.94	36	38	29159	78	24	7.32	0.9	1.7	1983	2.38	81
504	533424	5197112	4.0	<10	5.4	29	19.1	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method------>		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit------>			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units------>		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
505	535379	5196881	1.0	30.4	5.7	36	16.9	0.14	21.0	0.378	17.92	27	45	25943	66	19	4.53	1.5	2.2	3345	2.71	39
506	535220	5196025	10.0	49.4	5.7	27	19.1	0.15	4.4	0.965	6.60	30	35	8971	51	20	5.84	0.9	1.9	3961	1.48	99
507	536332	5194649	13.0	22.8	5.8	27	19.4	0.07	4.4	0.594	9.43	30	46	26899	77	22	6.65	1.7	1.5	1873	4.04	79
508	535530	5194428	4.0	64.8	5.4	24	18.6	0.14	3.1	0.693	4.37	12	48	12448	51	13	3.69	0.5	1.3	6333	1.63	83
509	536255	5193549	1.0	44.1	5.2	23	17.7	0.06	5.6	0.397	6.53	18	32	15301	44	17	3.16	0.8	1.1	4039	2.59	79
510	535842	5192721	5.0	55.8	5.6	28	19.3	0.16	4.8	0.523	13.98	21	57	8413	55	24	7.15	INF	INF	6013	2.34	76
511	536184	5192528	15.0	57.6	5.6	24	19.4	0.20	6.2	0.504	36.87	30	46	60365	38	20	7.99	1.4	0.8	5344	2.15	71
512	537348	5192135	NM	41.4	5.5	25	17.3	0.05	3.6	0.647	6.67	26	29	9952	74	18	3.26	0.9	0.6	3515	2.49	63
513	537569	5193740	5.0	70.4	5.0	18	18.6	0.06	1.9	0.840	8.46	17	23	5495	44	21	3.71	INF	INF	4666	0.86	79
514	537207	5195235	10.0	47.1	5.4	27	19.3	0.15	3.0	0.541	6.76	24	35	7061	50	16	5.76	0.8	1.8	3623	1.51	60
515	538024	5195317	4.0	50.0	4.4	26	19.2	0.10	1.9	0.629	3.44	16	34	3281	61	22	5.77	1.8	1.5	4137	1.23	50
516	537872	5196113	7.0	56.7	5.2	28	18.9	0.14	3.5	0.449	5.40	15	36	11268	47	17	6.30	0.7	1.4	4965	1.36	49
517	537547	5196971	2.0	57.1	4.7	26	18.3	0.08	4.7	0.464	3.92	11	26	1879	48	26	3.72	1.8	0.6	3818	2.61	34
518	537437	5197531	1.0	51.3	4.7	25	17.9	0.06	2.1	0.358	1.76	7	21	1643	37	19	2.83	0.5	1.2	3285	0.99	27
519	535230	5198691	8.0	37.0	5.5	31	19.2	0.23	8.3	0.929	10.12	41	75	20872	58	26	8.54	1.5	2.0	4416	4.16	98
520	533927	5198918	3.0	28.9	5.4	29	19.3	0.09	3.1	0.617	6.93	26	39	6733	57	21	3.71	0.9	1.8	4054	2.66	55
521	532962	5198186	5.0	51.6	5.2	25	19.5	0.11	4.5	1.043	12.56	30	46	17700	50	25	5.10	1.0	0.8	5480	4.82	111
522	531498	5199328	5.0	63.1	5.9	50	18.6	0.09	3.2	1.011	3.62	15	39	3862	55	14	9.36	INF	INF	8686	5.97	72
523	532413	5199831	20.0	44.9	6.2	42	19.5	0.19	4.6	1.081	7.73	27	45	8320	60	20	11.50	1.1	1.8	4428	4.01	81
524	532616	5201190	16.0	30.8	6.1	36	19.4	0.25	6.7	1.315	12.45	43	72	17739	68	34	8.39	2.0	2.2	2341	5.38	119
525	534931	5201616	3.0	41.6	6.1	37	19.2	0.11	4.9	0.662	4.93	20	93	6250	62	26	2.72	2.0	2.0	5153	4.7	61
526	534706	5200909	5.0	56.6	6.1	43	19.6	0.12	4.2	0.811	4.64	18	70	3203	50	32	3.48	1.8	0.7	7201	4.53	85
527	536721	5200332	3.0	58.5	6.0	32	18.6	0.11	4.9	0.980	12.77	27	69	11915	74	41	6.80	INF	INF	8045	3.33	97
528	536026	5201488	1.0	59.3	5.6	29	17.9	0.08	2.1	0.455	6.10	14	38	2376	78	29	3.17	0.9	<0.3	5188	0.86	55
529	533620	5203141	17.0	23.4	6.1	36	19.3	0.18	8.2	1.096	15.61	40	105	22707	107	42	6.31	2.9	2.9	1909	6.11	135
530	532526	5203158	2.0	50.1	5.8	26	19.3	0.11	1.9	0.525	5.41	26	37	3304	47	28	3.70	0.9	1.6	4646	1.35	36
531	532689	5204113	15.0	42.6	6.1	35	19.5	0.17	3.1	0.642	5.00	35	69	6795	58	23	7.97	1.3	1.8	3834	5.18	62
532	532074	5204963	27.0	43.1	6.1	31	19.2	0.21	5.8	0.921	14.33	51	70	32138	77	27	11.08	2.5	3.4	3439	5.92	92
533	530958	5202283	10.0	58.4	4.9	24	19.1	0.08	3.0	0.564	6.77	19	27	10493	56	25	10.94	0.8	<0.3	7495	2.43	51
534	529921	5202575	8.0	35.7	5.2	29	19.1	0.09	2.8	0.614	5.47	24	32	9273	79	19	6.72	0.5	1.4	2989	2.35	66
535	528946	5201371	7.0	47.2	5.6	34	18.7	0.13	4.4	0.651	6.12	31	65	12429	75	28	5.63	INF	INF	8283	5.76	82
536	529579	5200862	4.0	62.2	5.1	26	19.1	0.14	3.0	0.721	18.42	22	47	12246	50	24	4.97	0.6	1.6	6653	2.6	88
537	508809	5195678	10.2	21.5	5.4	24	18.7	0.15	4.0	0.564	28.88	46	33	61292	124	28	7.61	0.9	1.7	1490	9.82	107
538	509694	5194700	6.0	47.8	4.3	24	19.7	0.09	2.7	0.712	12.66	22	28	11020	38	24	4.74	0.7	1.8	3901	2.1	60
539	508399	5197155	5.0	29.4	4.2	25	19.4	0.05	1.4	0.246	5.24	20	21	4360	50	13	3.66	1.0	2.7	1966	3.84	34
540	508310	5196811	2.0	34.2	4.2	26	19.1	0.05	1.3	0.304	4.45	20	25	5561	40	21	4.72	0.8	<0.3	3191	4.14	27
541	508266	5196363	2.0	34.1	4.8	21	19.1	0.07	2.2	0.407	6.75	19	26	8989	64	24	11.25	1.0	1.8	3536	4.79	27
542	507888	5196533	2.0	42.1	5.1	26	19.0	0.11	3.2	0.916	12.23	27	34	16694	63	23	8.10	0.7	1.4	3188	9.51	85
543	506557	5196319	6.0	36.2	5.4	24	19.0	0.10	2.7	0.479	8.92	31	40	19899	88	23	8.80	1.0	1.8	3996	5.76	63
544	506313	5197656	NM	33.2	5.4	24	18.8	0.13	2.7	0.566	10.66	35	33	21841	76	22	9.85	0.9	1.7	2678	7.62	71
545	505579	5196915	6.0	45.7	5.2	25	18.6	0.12	1.8	0.475	5.97	20	37	15438	85	16	6.39	1.0	1.7	3571	3.45	52
546	504743	5197184	7.0	38.5	5.2	22	18.9	0.12	1.6	0.625	8.16	36	47	12651	86	22	5.45	1.1	2.5	2973	3.71	66
547	505090	5196240	15.0	49.9	4.8	21	18.8	0.11	1.5	0.446	3.25	21	58	2687	47	19	5.66	1.2	1.6	3888	5.66	36
548	505247	5195721	2.0	40.3	4.7	20	19.0	0.10	2.5	0.479	5.33	20	35	10623	50	21	5.60	0.7	3.1	3518	3.41	50
549	504433	5194453	3.0	<10	5.0	24	19.4	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
550	505050	5193945	8.0	49.7	5.3	22	19.6	0.13	3.2	0.760	8.44	21	43	11077	58	21	9.48	0.9	1.7	6961	2.18	70
551	504679	5193525	4.0	52.0	5.1	21	19.3	0.11	2.4	0.776	4.68	28	40	10248	63	17	11.22	INF	INF	4451	2.18	74
552	506229	5194355	4.0	39.9	4.8	21	16.9	0.12	2.3	0.297	2.52	12	28	4031	79	9	4.53	0.5	1.3	3850	5.84	36
553	506180	5194105	4.0	42.0	4.7	21	17.5	0.12	1.4	0.338	2.10	12	29	4711	61	13	5.57	0.5	1.3	3060	2.42	31
554	506366	5193368	6.0	67.4	4.0	28	18.3	0.19	0.8	0.715	2.24	8	43	3792	55	12	5.16	0.4	1.8	4385	2.5	51
555	505258	5192571	2.0	45.2	4.9	23	18.0	0.08	5.7	0.567	4.19	20	28	10602	71	25	10.42	0.9	2.0	3847	2.54	25
556	503596	5192949	9.0	62.2	5.4	18	19.9	0.15	1.3	0.655	6.32	23	47	9763	53	16	4.20	<0.3	0.7	5495	2.01	82
557	502892	5193262	5.0	54.0	5.6	26	19.4	0.19	INF	0.620	5.62	23	43	11482	85	22	10.00	INF	INF	5383	1.94	73
558	502284	5193493	0.4	50.5	5.1	22	18.4	0.08	2.1	0.425	3.72	9	27	5531	111	26	6.43	INF	INF	4303	1.85	23
559	501552	5193969	12.0	52.5	4.8	21	19.5	0.12	3.0	0.750	9.07	27	51	8871	62	21	8.23	INF	INF	4599	3.95	60
560	502071	5194721	1.0	44.7	4.2	27	18.8	0.08	1.1	0.331	5.41	12	26	2575	49	23	3.63	0.8	<0.3	3230	2.8	25
561	502044	5195630	0.5	NS	4.0	26	18.4	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
562	501269	5195768	8.0	35.9	4.2	22	19.4	0.10	2.5	0.561	6.77	37	40	12184	55	19	3.60	0.7	1.8	2686	2.73	60
563	500750	5195755	4.0	37.5	4.1	26	19.3	0.05	0.6	0.256	2.93	15	22	2509	44	12	2.67	INF	INF	2793	1.71	22
564	500288	5195017	7.0	34.6	4.2	25	19.3	0.08	2.2	0.354	4.49	26	32	6944	66	22	5.06	INF	INF	2949	2.69	43
565	500084	5194172	1.0	38.4	4.6	25	18.9	0.07	1.6	0.281	2.16	8	27	2591	39	23	6.53	INF	INF	3020	3.05	14
566	501355	5191737	10.0	65.9	4.7	18	18.9	0.16	2.8	0.509	4.51	16	46	5842	55	20	4.15	0.8	<0.3	4475	2.08	56
567	502320	5191449	11.0	33.3	5.3	26	18.9	0.15	6.2	0.876	9.35	32	34	15572	111	44	18.90	1.7	4.7	4194	1.82	66
568	503008	5190802	3.0	35.5	5.4	27	18.8	0.11	2.0	0.527	5.17	26	27	10540	137	22	6.26	INF	INF	3216	1.79	49
569	504058	5191072	8.0	35.8	5.6	27	19.6	0.20	INF	0.704	18.38	38	44	20333	126	30	13.74	INF	INF	2894	2.79	120
570	505108	5191319	6.0	50.6	5.4	22	19.5	0.37	INF	1.036	21.73	23	72	9718	65	30	32.94	INF	INF	3781	3.69	115
571	504504	5189899	7.0	31.3	5.6	28	19.3	0.13	2.5	0.626	9.49	34	29	17099	123	24	8.65	INF	INF	2625	2	78
572	504791	5189104	10.0	31.0	5.9	31	19.3	0.18	INF	0.703	11.68	33	30	20770	190	24	16.92	INF	INF	2934	2.04	87
573	504893	5188204	3.0	58.9	6.1	54	19.4	0.13	INF	0.837	9.93	18	67	5638	57	33	4.61	INF	INF	11573	9.81	108
574	502309	5189749	2.0	78.0	6.3	50	19.4	0.06	INF	0.710	7.54	18	38	4165	149	38	3.83	INF	INF	11065	2.81	104
575	502125	5189163	11.0	51.8	6.2	28	19.8	0.25	6.1	1.383	12.65	23	55	10801	76	45	25.98	1.6	2.1	8782	4.79	146
576	502191	5185250	1.0	60.1	5.9	24	19.7	0.10	1.6	0.586	9.66	25	33	3965	60	31	3.20	0.6	<0.3	4662	2.14	76
577	501972	5184968	6.0	54.2	5.7	22	19.5	0.18	1.8	0.671	4.56	22	37	7481	54	25	6.86	0.8	1.8	5416	1.28	76
578	501305	5185283	7.0	59.0	5.7	21	19.9	0.19	7.1	0.940	8.84	22	37	12517	58	35	18.87	1.2	2.3	8182	1.36	94
579	500254	5184482	16.0	44.1	6.0	27	19.8	0.25	14.0	1.123	10.02	34	45	18872	92	38	29.22	INF	INF	8235	1.64	109
580	500990	5183199	1.0	69.6	5.8	27	19.5	0.13	3.3	0.779	4.52	11	43	8323	41	55	11.63	INF	INF	5850	1.25	28
581	501512	5180630	2.0	55.4	5.7	24	19.0	0.08	1.5	0.563	2.79	28	41	20957	56	28	3.02	INF	INF	3967	1.01	113
582	500075	5181239	3.0	54.5	5.4	23	18.8	0.10	2.5	0.946	10.55	11	25	3497	51	19	3.96	0.7	1.7	4025	1.51	25
583	500535	5180423	1.0	NS	5.5	30	18.6	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
584	500966	5179880	11.0	45.5	5.7	26	19.2	0.15	2.3	0.518	8.80	44	24	21381	192	27	8.61	0.7	1.7	1435	1.12	104
585	500790	5178459	12.0	48.1	5.9	30	19.9	0.31	3.5	1.065	17.61	40	67	17620	77	24	8.20	1.7	0.7	5572	4.7	103
586	502709	5178179	4.0	60.2	5.7	29	20.0	0.08	3.1	0.688	6.51	16	27	3811	57	23	3.87	<0.3	<0.3	5012	1.36	83
587	502300	5178285	8.0	48.0	5.8	32	19.8	0.12	1.8	0.818	7.81	41	38	12760	51	29	5.59	1.0	2.6	3349	1.65	64
588	502456	5179769	2.0	54.8	5.8	27	19.5	0.10	1.1	0.558	3.62	19	34	3459	46	18	2.59	0.4	1.3	4925	1.17	70

Site Number	Easting	Northing	Lake Depth	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
	Method------------>			Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit------->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.06	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units------------>		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
589	502553	5181828	1.0	31.9	5.4	25	19.9	0.20	3.8	0.499	3.08	19	35	4241	55	40	11.98	1.6	2.0	2276	2.23	28
590	503641	5183794	1.0	30.9	5.9	50	19.8	0.16	12.0	1.519	28.42	52	59	27065	67	55	12.33	2.0	2.1	7071	5.45	221
591	503884	5184209	1.0	27.4	6.1	53	19.2	0.08	2.3	0.469	5.72	12	21	7419	79	11	4.92	INF	INF	7223	1.03	70
592	504339	5183499	NM	30.1	6.1	53	19.1	0.09	2.9	0.599	4.12	56	41	10057	95	39	6.71	1.1	1.6	4749	1.03	87
593	504817	5180650	1.0	85.2	6.3	38	20.3	0.06	1.4	0.576	3.17	44	24	16259	53	27	1.99	INF	INF	3051	0.69	110
594	505695	5179198	1.0	40.3	6.5	78	19.9	0.13	8.1	1.111	9.56	30	25	8184	69	23	9.24	2.6	1.9	2640	3.75	64
595	505431	5178754	1.0	36.5	6.6	96	20.1	0.07	8.5	0.774	9.31	43	29	10110	97	28	4.75	1.9	0.8	10934	4.23	73
596	506476	5178689	9.0	50.2	6.3	27	20.3	0.08	3.9	0.607	2.60	12	26	6355	64	23	5.55	0.7	<0.3	3769	1.26	51
597	506281	5178260	1.0	37.8	4.8	29	21.2	0.04	1.7	0.263	1.83	11	10	3359	47	18	3.84	0.3	1.2	2247	1.43	14
598	505475	5177761	3.0	47.9	6.2	92	20.8	0.10	4.2	0.944	6.24	27	30	10199	105	25	5.53	1.0	1.7	4323	1.9	90
599	504729	5178019	2.0	48.9	6.6	61	20.2	0.04	1.6	0.410	3.00	12	14	2751	41	13	2.61	0.3	1.2	3631	0.82	40
600	504340	5177821	3.0	32.2	6.0	27	20.6	0.06	1.7	0.346	2.71	21	28	4027	50	16	[illegible]	INF	INF	2801	2.09	27
601	503831	5177402	6.0	32.3	6.2	52	20.2	0.31	23.0	3.095	35.91	63	100	33769	83	146	49.56	4.8	5.0	8432	4.04	316
602	500755	5176213	6.0	56.6	6.2	26	20.1	0.12	1.4	0.623	1.70	10	30	7050	51	12	2.58	<0.3	1.3	4249	1.26	60
603	500189	5175580	6.0	55.1	5.9	26	20.0	0.07	2.0	0.912	10.00	32	51	18594	65	43	4.80	1.3	0.8	6398	2.2	106
604	500599	5175085	19.0	43.8	5.9	26	19.9	0.18	5.0	0.921	9.12	35	63	15488	74	41	15.15	2.3	2.4	4216	2	86
605	501324	5174697	1.0	88.9	5.3	26	20.3	0.24	7.0	1.013	4.71	9	102	4584	49	123	24.31	4.6	3.2	6773	2.4	51
606	502877	5175287	7.0	45.3	[illegible]	25	20.3	0.12	2.8	1.311	7.29	20	37	4603	47	23	10.48	INF	INF	5469	3.22	118
607	528915	5194105	10.0	45.8	6.7	34	17.4	0.10	3.3	0.640	6.32	28	33	5677	45	21	8.82	0.8	0.8	3374	2.9	48
608	528784	5196344	23.0	49.4	4.4	27	18.8	0.16	7.5	0.839	29.66	39	49	29736	56	25	12.35	1.1	1.1	3413	4.19	81
609	529515	5196112	11.0	NS	3.9	30	18.3	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
610	531383	5195170	3.0	60.9	4.5	25	17.3	0.20	28.0	0.681	10.33	45	61	22878	74	24	8.27	2.8	1.6	13912	5.58	78
611	531559	5196095	3.0	61.8	5.1	29	17.6	0.09	5.2	0.772	6.97	22	51	8778	67	34	9.02	INF	INF	7096	4.34	80
612	532227	5196509	2.0	47.4	5.3	29	17.5	0.10	7.4	0.769	10.99	43	135	13174	73	44	7.78	3.3	1.7	9919	7.16	72
613	532440	5197227	1.0	62.1	5.2	29	17.1	0.10	2.3	0.578	6.72	22	66	8032	51	24	3.64	INF	INF	7389	4.1	61
614	531622	5198186	3.0	68.2	5.3	30	17.1	0.11	INF	0.919	7.87	22	48	11044	73	37	15.12	INF	INF	10460	4.27	100
615	531364	5196839	3.0	39.9	5.6	29	17.3	0.06	3.6	0.583	5.93	22	38	8350	90	29	7.10	6.9	0.8	4267	3.3	64
616	530687	5197178	11.0	20.9	5.7	30	17.8	0.06	2.2	0.235	4.00	24	23	8861	101	18	5.88	0.8	1.5	1878	2.26	39
617	529500	5197850	3.0	46.5	5.4	25	17.4	0.05	1.3	0.338	2.52	8	19	2484	57	13	2.77	2.2	1.0	2816	1.15	28
618	528564	5197761	NM	40.2	4.2	26	18.0	0.11	3.7	0.717	10.87	27	31	8989	83	22	8.36	2.2	1.0	3119	3.02	64
619	528300	5197371	9.0	42.9	4.2	27	19.0	0.08	2.9	0.813	8.05	24	33	7807	47	22	9.27	0.9	0.7	3908	2.81	57
620	528758	5198173	4.0	33.0	4.1	27	18.6	0.07	3.0	0.496	10.80	26	23	10181	65	26	6.55	0.4	1.5	2413	2.61	73
621	528088	5198520	5.0	35.3	4.1	28	18.5	0.08	2.2	0.530	6.78	21	22	7389	72	21	8.53	0.4	1.5	2943	1.95	42
622	527625	5198934	4.0	30.9	4.1	28	18.3	0.05	1.5	0.374	6.10	18	19	6687	76	17	4.57	<0.3	<0.3	2025	1.77	40
623	528876	5198539	1.0	46.6	4.6	25	16.3	0.06	2.6	0.505	3.82	13	23	3450	48	22	9.96	<0.3	0.6	3781	2	20
624	529118	5198732	2.0	47.7	3.9	31	16.9	0.10	1.9	0.570	7.74	25	29	5285	59	29	5.16	0.7	<0.3	2932	2.24	53
625	529671	5200020	40.0	NS	5.8	30	18.0	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
626	528041	5201228	14.0	38.1	5.9	36	18.1	0.18	4.0	0.556	5.84	20	41	10641	131	23	20.39	1.3	1.0	5981	3.53	69
627	529108	5203880	5.0	49.6	5.8	28	17.1	0.09	1.9	0.504	3.44	13	24	6372	58	16	6.48	<0.3	<0.3	3711	1.74	42
628	531162	5204885	1.0	51.0	5.3	29	16.1	0.07	INF	0.470	4.89	11	28	3273	44	24	9.16	INF	INF	4841	1.97	20
629	531507	5204352	10.0	NS	5.8	33	18.1	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
630	530151	5205045	9.0	40.9	5.8	27	17.7	0.09	2.2	0.503	5.57	18	23	8541	75	17	7.20	0.7	1.5	3196	2.16	44
631	527743	5203425	12.0	66.8	4.9	24	17.5	0.20	3.4	1.066	4.44	12	41	3396	60	13	6.66	INF	INF	6046	1.49	115
632	527376	5203209	7.0	69.8	4.4	24	17.5	0.08	1.8	0.932	2.76	16	25	3600	50	11	4.06	0.7	<0.3	4701	0.86	102
633	527125	5202066	3.0	62.5	5.2	27	17.3	0.11	9.4	0.552	16.74	35	45	56647	75	28	3.27	2.3	1.2	9499	2.56	100
634	526892	5203035	7.0	63.2	5.8	34	17.6	0.12	1.7	0.717	3.21	20	35	6283	47	20	4.16	<0.3	<0.3	5286	2.31	64
635	527357	5203916	10.0	43.0	6.0	35	17.7	0.12	5.3	0.541	7.16	28	36	17011	84	23	11.61	1.8	1.2	4408	1.78	52
636	526986	5204747	8.0	49.1	6.0	33	17.8	0.09	2.1	0.774	3.63	29	46	4337	56	17	6.86	1.5	1.1	4003	1.96	46
637	526101	5204899	20.0	39.7	4.9	25	18.2	0.10	5.3	0.337	13.44	39	47	29221	105	34	10.67	2.0	1.6	5698	2.09	60
638	525222	5204868	6.0	47.5	5.1	25	18.1	0.08	3.5	0.747	7.32	27	35	7173	56	16	5.14	2.1	1.4	3388	1.92	61
639	524944	5204088	11.0	41.8	5.6	25	18.0	0.09	4.2	0.740	6.28	31	43	10462	60	21	10.91	2.0	2.3	3723	3.05	63
640	525083	5202222	10.0	52.6	5.5	25	17.4	0.10	2.6	0.645	10.07	27	34	11992	53	19	7.28	0.9	0.8	3562	4.53	57
641	524697	5200960	8.0	22.7	5.7	26	16.6	0.04	1.6	0.317	4.96	24	16	9166	76	16	3.47	<0.3	0.7	1701	1.93	37
642	523886	5201864	3.0	47.8	5.7	33	15.1	0.04	1.9	0.533	6.22	25	23	8667	41	20	3.92	<0.3	0.6	3229	1.43	55
643	523632	5202833	1.0	56.2	4.4	27	16.9	0.04	2.1	0.412	2.47	11	17	4085	47	17	5.57	<0.3	<0.3	3403	1.1	21
644	523725	5203237	4.0	53.8	4.6	21	17.0	0.04	2.1	0.587	3.74	19	22	7405	54	18	4.70	0.6	<0.3	3333	2.51	43
645	523932	5204065	4.0	41.8	4.7	24	16.7	0.06	2.1	0.421	3.38	18	24	4708	59	17	4.81	0.7	0.7	3404	1.65	34
646	524173	5204727	5.0	39.5	4.9	26	16.9	0.04	2.4	0.478	5.24	27	28	9235	66	19	4.54	1.7	2.2	2841	1.68	49
647	522508	5204950	2.0	59.9	5.1	25	16.9	0.04	2.1	0.317	2.67	12	25	1531	44	17	5.30	0.9	<0.3	3066	1.47	13
648	522588	5202744	9.0	42.6	4.5	25	16.2	0.08	1.9	0.533	7.28	25	25	10803	71	15	7.22	<0.3	<0.3	2469	1.87	38
649	521552	5203165	1.0	41.5	4.6	23	15.3	0.06	4.0	0.477	5.00	15	27	4766	36	26	12.98	0.8	0.7	3653	1.43	20
650	520819	5203534	4.0	45.9	5.0	22	16.9	0.13	2.5	0.566	3.57	29	51	6808	64	16	6.57	<0.3	<0.3	3545	1.38	73
651	521065	5204138	4.0	63.7	5.4	28	17.0	0.07	INF	0.524	4.51	18	40	4132	62	17	6.89	INF	INF	6300	1.11	69
652	521022	5204936	18.7	47.4	5.8	28	17.6	0.25	12.0	1.022	23.67	40	49	39203	46	39	27.51	2.1	1.1	6548	5.98	93
653	520454	5204486	14.0	49.4	5.9	25	17.7	0.16	4.0	0.682	11.10	45	43	19284	50	23	8.45	1.5	0.8	3611	6.66	83
654	519936	5204719	5.0	31.8	5.5	24	16.9	0.13	2.3	0.321	8.33	34	25	13047	54	18	6.91	0.7	<0.3	1806	2.68	47
655	520145	5203460	4.0	36.7	5.8	32	16.6	0.08	2.2	0.286	3.64	29	41	2957	59	15	2.87	1.8	0.9	4966	3.33	30
656	519668	5202684	16.0	28.4	5.9	31	16.6	0.15	6.7	0.410	25.64	42	38	45743	71	26	16.07	1.4	1.9	2849	3.54	57
657	520987	5200992	NM	49.3	4.4	27	17.2	0.06	2.1	0.391	9.16	19	55	2260	37	30	5.35	1.2	0.7	3781	2.81	30
658	521248	5202232	1.0	73.8	3.9	34	17.1	0.12	2.6	0.755	5.16	10	47	4220	55	12	6.85	INF	INF	5044	1.78	57
659	521893	5201654	6.0	47.7	4.1	26	17.1	0.07	2.4	0.461	7.10	21	30	12474	68	17	8.00	<0.3	<0.3	3128	1.42	43
660	522772	5200950	7.0	52.0	4.4	22	16.8	0.07	2.0	0.565	4.32	21	25	5436	59	19	4.80	INF	INF	3166	1.44	39
661	521802	5199865	1.0	55.7	4.0	29	16.5	0.08	3.4	0.783	5.81	9	49	1179	41	55	19.09	1.6	0.9	4780	1.52	31
662	523317	5199788	9.0	74.1	4.0	30	17.3	0.10	1.4	0.846	1.66	9	43	4491	47	11	2.79	INF	INF	4570	0.94	101
663	52459[illegible]	5199723	3.0	NS	4.7	24	17.2	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
664	526056	5201259	28.0	42.0	5.3	25	18.5	0.22	9.4	0.991	14.01	58	57	50288	87	31	15.32	1.7	1.2	5247	4.66	110
665	526807	5199627	31.0	24.4	4.3	27	17.9	0.11	6.4	1.056	10.32	44	45	27968	75	26	7.01	1.3	0.9	1797	3.42	105
666	527427	5198122	7.0	43.8	4.4	26	17.4	0.16	3.0	0.582	9.44	28	34	11287	66	19	7.30	0.7	<0.3	3247	2.68	57
667	527916	5194324	9.0	53.8	4.1	27	17.3	0.15	3.4	1.057	4.76	30	32	6244	40	19	6.16	INF	INF	4820	1.46	68
668	527100	5194050	6.0	60.2	3.9	37	17.1	0.12	2.8	0.829	2.77	22	32	5875	46	21	4.93	<0.3	<0.3	5586	1.51	60
669	527658	5192886	NM	42.8	3.9	35	17.0	0.06	2.1	0.376	4.35	13	33	1958	42	20	3.60	<0.3	<0.3	3162	6.19	31
670	522561	5197528	28.0	21.8	5.2	24	17.9	0.10	6.6	0.863	41.96	37	34	47154	110	32	7.01	1.4	1.1	1898	2.95	92
671	523522	5197556	2.0	23.6	4.3	25	17.7	0.05	1.7	0.310	4.98	26	24	11950	56	16	3.40	0.7	<0.3	1863	4.28	31
672	524848	5197319	13.0	18.0	4.5	27	18.9	0.06	3.5	0.414	8.99	32	25	25823	103	22	5.73	1.0	0.6	2051	2.13	55

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method----------------->		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit------->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units----------------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
673	525988	5197912	8.0	29.0	4.5	27	18.6	0.06	3.1	0.372	10.06	29	25	12592	57	21	4.72	0.7	0.7	2166	2.39	44
674	527578	5196703	9.0	46.6	4.2	22	18.3	0.09	3.3	0.804	6.52	20	27	6644	43	19	7.20	0.6	<0.3	3684	9.38	61
675	526454	5196470	20.0	40.9	4.1	29	18.1	0.12	6.2	1.044	9.48	41	42	21566	51	22	6.68	1.4	2.4	3134	3.41	103
676	525867	5196208	8.0	NS	4.3	20	18.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
677	524845	5196435	7.0	39.3	4.1	30	18.5	0.07	2.9	0.759	7.68	32	24	8539	38	18	3.87	0.9	0.6	3014	2.92	61
678	526723	5195237	19.0	49.7	3.9	31	18.1	0.12	2.8	1.048	4.81	37	38	8311	50	20	7.23	<0.3	0.8	3867	1.82	66
679	526944	5194407	9.0	42.9	3.9	35	17.7	0.07	3.0	0.617	2.63	21	21	5234	41	14	4.44	<0.3	1.2	2852	1.83	40
680	526561	5194654	12.0	42.4	4.0	33	18.3	0.06	2.9	0.767	6.11	29	32	8264	54	21	6.30	0.7	0.9	3459	2.87	53
681	526412	5194306	7.0	31.9	4.0	30	19.2	0.03	1.9	0.493	5.72	27	19	9722	43	20	4.70	<0.3	<0.3	2537	2.65	58
682	525732	5195067	4.0	46.2	4.0	30	18.6	0.10	3.6	0.791	8.95	29	40	7819	44	16	5.44	2.3	1.2	3617	6.07	60
683	524999	5193530	4.0	19.2	4.7	25	18.5	<0.02	4.5	1.577	15.16	27	20	47158	41	19	2.69	<0.3	0.8	1537	2.66	153
684	524196	5194592	9.0	18.0	5.0	25	18.3	0.02	4.2	0.395	14.22	29	19	29864	102	21	4.90	0.6	0.8	1655	2.09	66
685	524000	5193172	17.0	35.8	4.1	30	18.7	0.09	2.1	0.542	14.76	37	36	12947	53	25	5.87	0.7	1.0	2796	2.82	64
686	524139	5192038	2.0	19.4	4.0	35	17.7	0.06	1.8	0.160	3.52	27	30	3507	30	20	3.53	<0.3	<0.3	1648	2.86	19
687	523410	5192490	9.0	NS	4.5	28	18.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
688	522834	5192985	7.0	39.3	5.2	25	18.9	0.13	18.0	0.946	21.87	38	48	73687	62	42	8.60	1.5	1.4	6181	3.86	84
689	522611	5194261	14.0	43.4	5.1	24	18.2	0.07	4.6	0.726	6.12	29	35	10916	62	26	10.33	1.3	1.7	3761	3.23	59
690	523127	5195146	4.0	68.1	5.5	28	18.1	0.05	3.1	0.695	4.69	17	25	6849	52	19	6.20	INF	INF	5773	2.9	66
691	523536	5195906	10.0	37.6	5.4	25	18.8	0.08	4.6	0.654	6.62	37	37	22098	62	27	7.89	0.9	1.2	3356	3.06	72
692	521272	5197572	10.0	43.2	4.2	26	18.7	0.05	2.9	0.646	9.91	35	28	10694	48	22	5.92	0.9	0.9	3944	2.86	59
693	520956	5197910	2.0	59.1	4.1	29	17.9	0.03	1.4	0.909	15.65	21	24	6546	67	30	2.80	INF	INF	4673	2.8	67
694	520181	5197619	6.0	30.1	4.0	34	18.6	0.07	4.1	0.534	5.39	27	28	11079	94	18	5.22	1.6	2.0	2723	1.55	46
695	520734	5197200	1.0	36.7	4.0	31	17.7	0.03	1.3	0.292	3.58	27	21	5990	26	21	3.65	0.9	0.6	3656	3.79	16
696	520664	5196639	14.0	49.8	4.1	30	18.6	0.07	3.0	0.526	5.78	32	28	5291	57	18	6.74	0.7	0.8	4050	2.17	42
697	519587	5196026	3.0	33.9	4.3	26	19.4	0.05	1.5	0.458	23.18	37	35	18897	38	21	4.21	0.9	0.8	2886	3.78	51
698	518918	5196026	4.0	28.9	4.3	26	19.4	0.03	1.9	0.389	24.80	33	35	15402	42	23	4.84	<0.3	0.9	2549	3.78	52
699	519555	5195431	3.0	38.7	4.2	30	19.0	0.04	0.8	0.251	4.30	18	37	2260	40	14	2.96	0.7	0.6	2466	3.15	12
700	520864	5195003	3.0	37.8	4.1	29	18.2	<0.02	1.6	0.374	7.58	14	16	2183	55	17	4.31	<0.3	0.6	3033	2.41	17
701	520582	5194139	30.0	51.2	4.1	28	18.5	0.09	1.7	0.727	7.10	29	37	7668	52	17	7.16	<0.3	0.6	3016	2.87	42
702	520096	5194525	9.0	50.1	4.2	25	18.9	0.06	2.2	0.999	8.25	21	31	5748	36	18	3.52	1.0	0.7	4850	2.92	66
703	519337	5194598	9.0	52.8	4.2	28	18.6	0.10	2.4	0.631	9.92	29	59	8314	40	16	5.23	1.0	1.8	4634	3.63	46
704	519577	5193201	15.0	57.2	4.1	26	18.9	0.12	3.3	0.522	8.25	28	65	9712	46	20	6.15	0.7	0.7	5778	3.92	43
705	520899	5193172	6.0	61.6	4.1	28	17.7	0.04	1.3	0.625	2.83	9	25	3124	42	13	2.92	<0.3	<0.3	4331	1.49	55
706	520454	5192458	4.0	45.9	4.2	28	18.4	0.05	1.9	0.463	3.96	16	34	4830	48	12	4.08	0.6	1.5	3239	2.98	36
707	519282	5192072	1.0	19.6	4.1	29	17.6	<0.02	1.5	0.074	4.32	21	22	4054	42	14	3.76	0.4	1.2	1409	3.2	12
708	519730	5191747	15.0	40.3	4.2	26	18.6	0.07	3.8	0.505	8.31	32	87	5663	59	21	6.77	1.1	1.9	3561	4.68	42
709	519936	5191114	14.0	57.7	4.2	24	18.8	0.05	2.3	0.927	2.55	20	33	5639	49	16	4.80	<0.3	<0.3	3590	1.5	51
710	520407	5190209	15.0	55.5	4.4	27	19.1	0.09	3.3	1.056	14.44	36	69	13861	50	21	6.89	0.8	0.9	5985	5.08	72
711	520009	5189954	4.0	74.2	5.3	26	17.9	<0.02	1.6	0.823	2.43	11	24	7176	42	12	2.66	<0.3	<0.3	5337	3.9	97
712	520767	5190291	3.0	27.6	4.2	30	18.3	0.02	1.0	0.176	1.01	18	45	1591	27	16	3.41	<0.3	<0.3	2092	3.97	9
713	522797	5189149	4.0	41.9	4.2	31	18.8	0.07	1.3	0.580	4.85	19	37	1752	31	21	4.09	<0.3	1.3	3011	3.33	43
714	522468	5189881	22.0	45.3	5.2	26	19.0	0.14	4.5	0.942	54.53	42	73	24076	68	27	8.84	1.4	1.7	4638	4.79	80
715	522189	5190663	0.4	23.0	5.4	29	17.5	<0.02	1.1	0.217	2.09	12	22	1715	32	12	2.08	<0.3	<0.3	1512	1.83	7
716	521199	5191731	8.0	56.3	4.0	35	17.7	0.08	2.1	0.482	4.18	15	71	4908	49	17	3.50	INF	INF	4177	2.51	50
717	522173	5191328	20.0	41.1	4.3	28	18.9	0.08	3.0	0.559	11.02	44	88	11271	77	22	8.43	1.0	1.1	2750	3.85	53
718	523286	5191243	1.0	43.7	4.1	31	17.4	0.06	1.2	0.338	3.08	21	23	2240	39	22	4.49	0.7	1.7	2609	3.14	27
719	523271	5190420	0.2	23.2	4.2	30	15.8	0.06	1.4	0.119	3.82	24	34	3526	47	15	3.92	1.1	1.6	1809	3.67	12
720	525867	5189546	10.0	64.5	4.1	34	18.1	0.11	1.5	1.048	2.11	19	24	3778	42	14	4.25	<0.3	1.6	4982	0.98	60
721	527506	5189474	NM	53.1	4.2	28	18.7	0.08	2.1	0.857	12.32	22	40	7222	48	17	3.75	<0.3	<0.3	3697	2.05	54
722	527894	5187720	6.0	33.6	4.1	32	18.2	0.03	2.7	0.532	41.14	20	13	7364	58	28	4.51	0.4	1.4	2684	2.9	51
723	525930	5182922	6.0	63.5	4.2	23	16.8	0.09	5.0	0.766	5.25	10	38	2509	43	22	5.16	1.1	2.0	5705	6.56	79
724	526748	5180411	0.7	83.4	5.3	26	18.1	0.15	INF	1.284	9.51	19	70	6186	37	101	16.66	INF	INF	8076	2.44	59
725	505854	5170328	12.0	37.0	7.3	70	18.8	0.24	11.0	1.569	28.01	50	57	29720	76	54	24.70	2.8	2.4	5190	4.06	199
726	504030	5170442	2.0	10.5	7.2	69	18.2	0.10	12.0	0.900	25.84	41	35	25190	81	47	8.74	1.6	0.9	3903	2.95	175
727	502727	5171635	1.0	38.3	NM	NM	NM	0.33	6.5	1.636	9.85	162	234	16099	174	184	47.75	21.1	25.5	9612	21.9	80
728	501680	5169884	1.0	73.1	7.6	74	16.4	0.05	14.0	0.522	1.78	76	62	2969	70	19	3.00	INF	INF	10280	2.33	51
729	500854	5172100	2.0	85.3	7.3	66	16.1	<0.02	INF	0.682	0.61	23	16	1029	96	9	1.20	INF	INF	10172	4.22	69
730	502117	5173115	7.0	15.4	6.7	37	19.0	0.05	1.5	0.531	6.61	26	25	13354	102	23	5.22	1.2	1.5	2130	1.43	91
731	501134	5173119	8.0	25.7	6.7	42	18.8	0.09	2.9	1.484	10.25	38	42	16528	98	35	9.60	1.3	2.3	2813	1.7	217
732	479840	5165591	12.0	54.0	6.6	23	18.1	0.31	7.1	1.437	11.58	24	55	16340	54	44	29.22	2.1	3.1	7641	1.34	118
733	479162	5165920	0.6	30.4	5.5	14	16.5	0.21	8.2	0.805	4.40	18	48	5972	46	73	26.00	2.8	3.3	2652	1.13	47
734	479245	5166194	7.0	48.6	5.2	19	17.0	0.09	1.3	0.545	2.12	10	26	3675	37	15	3.46	<0.3	1.1	3424	0.83	50
735	478794	5165809	6.0	54.4	5.6	20	19.3	0.09	2.0	1.016	11.14	28	37	18341	64	30	7.10	INF	INF	5368	1.62	134
736	478093	5165968	3.0	30.8	4.8	20	18.4	0.05	1.1	0.369	3.76	25	27	5105	48	21	5.09	<0.3	<0.3	2008	1.39	24
737	477275	5166041	5.6	72.0	5.2	15	13.5	0.06	1.6	0.906	1.97	12	28	10619	50	13	4.14	<0.3	<0.3	5172	0.65	100
738	476482	5165044	3.0	61.5	5.4	20	17.7	0.18	2.3	0.836	3.65	21	56	9196	53	20	4.76	INF	INF	6231	1.11	86
739	478577	5164487	1.0	14.2	5.9	60	16.7	0.12	2.9	0.627	14.28	65	29	22051	143	58	12.73	0.9	1.1	1876	1.01	95
740	476883	5163954	9.0	46.3	6.3	41	18.6	0.17	2.6	0.895	6.95	34	43	15367	125	27	9.71	0.8	1.9	10401	1.31	111
741	475514	5165044	23.0	20.0	6.2	23	18.1	0.14	3.9	0.851	8.04	45	46	13187	113	31	8.47	1.3	2.1	1646	2.51	104
742	475152	5165452	12.0	37.6	6.2	24	18.9	0.09	3.0	0.793	7.12	35	42	21991	63	27	8.57	1.3	2.3	3737	1.68	128
743	474929	5166058	44.0	20.3	3.3	1863	17.0	0.09	4.5	0.926	17.57	44	34	29303	362	45	8.94	1.3	1.9	3784	1.72	113
744	474165	5170850	1.0	59.0	3.9	239	16.6	0.07	1.4	0.371	3.68	20	31	3733	39	25	1.98	<0.3	<0.3	3443	0.93	18
745	473058	5170506	3.0	53.0	4.1	27	17.1	0.08	1.7	0.687	8.06	31	32	8424	49	28	3.50	0.4	1.4	3578	1.04	81
746	471642	5168914	1.0	58.0	3.7	259	17.8	0.08	3.8	0.621	7.82	27	42	14440	553	31	3.53	0.7	0.8	11787	3.36	84
747	469694	5169362	1.0	NS	5.2	25	17.7	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
748	468427	5169426	4.0	52.8	5.2	20	18.3	0.12	1.7	0.835	7.32	28	31	5526	44	31	8.05	<0.3	0.6	4605	1.68	101
749	467620	5169556	8.0	57.3	4.9	20	17.8	0.16	1.8	0.509	6.25	19	35	12013	47	16	4.37	<0.3	1.1	7473	1.76	88
750	466907	5168846	2.0	45.3	5.3	20	17.0	0.11	2.6	0.627	11.06	20	25	9143	44	22	8.49	0.6	1.5	4242	3.42	62
751	466686	5168334	5.0	51.3	4.2	22	16.2	0.13	1.5	0.470	2.31	21	29	9619	53	14	5.72	0.3	1.3	4085	1.13	57
752	466428	5169121	0.6	55.4	4.7	19	16.6	0.08	2.3	0.533	4.36	12	18	4829	31	15	6.93	INF	INF	3508	3.14	26
753	466529	5169954	0.9	47.8	4.6	26	16.5	0.09	1.7	0.314	1.86	22	24	3302	31	17	5.26	0.7	0.6	2424	6.62	9
754	465876	5169914	4.0	54.8	4.9	24	17.8	0.07	3.5	0.598	5.61	17	18	7164	63	14	4.62	<0.3	<0.3	5298	2.25	69
755	465163	5170191	7.0	36.9	5.6	24	18.0	0.36	7.2	0.896	33.42	38	50	76076	54	27	13.96	1.1	0.9	4613	9.01	84
756	464918	5169708	3.0	58.1	4.1	20	17.0	0.10	1.6	0.705	1.68	12	26	5974	52	13	4.83	<0.3	1.0	3666	1.44	80

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method---------------->		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit------>			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units---------------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
757	465142	5168900	6.0	74.8	4.7	13	15.0	0.10	1.7	0.918	1.49	10	29	7346	54	11	3.73	<0.3	<0.3	4879	0.94	100
758	464507	5169141	3.0	53.0	4.4	19	16.5	0.04	2.0	0.456	4.94	14	19	3698	49	18	4.19	<0.3	<0.3	3493	1.27	54
759	464452	5169902	10.0	26.2	4.9	18	18.6	0.12	0.9	0.364	3.94	28	26	6395	46	16	6.99	<0.3	<0.3	1895	2.05	64
760	463427	5170241	7.0	56.9	4.6	18	18.2	0.18	1.8	0.692	5.40	23	30	8670	65	17	8.25	<0.3	<0.3	4414	2.27	65
761	463754	5170405	6.0	53.8	4.8	19	17.8	0.10	2.1	0.665	3.82	19	27	5023	50	16	6.32	<0.3	1.0	4582	1.9	74
762	463477	5170597	15.0	59.5	4.3	21	18.2	0.16	1.9	0.616	5.62	20	38	7362	54	20	4.59	<0.3	1.4	5396	1.84	62
763	463279	5173174	1.0	71.6	5.4	26	15.9	0.09	2.0	0.939	5.94	14	25	11465	64	16	3.50	INF	INF	5393	10.3	88
764	461784	5173299	5.0	73.3	4.5	24	17.2	0.07	2.7	0.689	2.68	18	30	6784	77	14	4.46	INF	INF	7753	17	83
765	462449	5172538	1.0	NS	NM	NM	NM	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
766	462382	5172182	7.0	63.7	4.6	23	18.3	0.14	1.9	0.560	2.65	8	24	6641	54	11	5.58	<0.3	1.1	4548	4.3	66
767	462159	5171115	2.0	55.2	4.9	18	16.9	0.11	3.8	0.873	3.94	11	25	6101	51	28	15.38	0.8	<0.3	5371	2.43	54
768	462161	5170730	6.0	48.7	5.1	17	18.2	0.10	2.3	0.501	5.23	24	22	9337	65	18	6.25	<0.3	<0.3	2812	2.43	52
769	461890	5168734	1.0	44.5	5.4	30	17.0	0.14	6.4	1.107	12.52	21	26	14738	65	46	20.54	<0.3	1.8	4467	2.28	83
770	462518	5168445	16.0	55.3	5.4	26	18.3	0.18	2.6	0.521	4.02	18	31	14575	64	17	14.65	1.2	2.9	3913	2.23	44
771	463377	5168671	2.0	42.4	4.9	17	18.7	0.10	1.1	0.365	3.98	16	29	3385	39	18	4.91	0.4	1.5	2944	3.04	23
772	463983	5167980	3.0	45.4	4.1	23	17.0	0.05	1.0	0.370	2.04	9	16	2251	46	13	4.19	<0.3	0.9	2832	0.82	26
773	465541	5167594	3.0	49.2	4.9	18	17.1	0.10	<0.5	0.408	1.86	7	19	4460	46	10	2.67	<0.3	<0.3	3414	0.81	37
774	465446	5167112	1.0	NS	4.3	13	16.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
775	466202	5167453	2.0	43.2	4.4	NM	17.1	0.08	4.1	0.339	1.78	12	18	3697	75	10	3.23	<0.3	<0.3	2620	0.93	24
776	466860	5164983	11.0	62.5	4.5	NM	17.0	0.16	7.1	0.531	2.41	10	41	9377	60	11	2.32	<0.3	1.1	5657	0.61	84
777	466974	5164764	3.0	55.8	NM	NM	NM	0.10	18.0	0.619	1.80	11	28	6217	70	10	2.46	<0.3	1.0	3757	0.65	72
778	465517	5162164	42.0	20.7	5.8	52	18.1	0.19	3.1	1.150	21.92	54	43	48096	155	51	7.94	0.9	1.7	1352	2.5	141
779	464439	5160484	12.0	16.5	6.0	51	18.3	0.10	5.8	0.414	9.25	45	23	20574	140	33	6.18	<0.3	0.6	1226	1.55	88
780	463612	5159305	26.0	28.1	6.1	51	18.1	0.20	15.0	0.786	15.10	48	40	40917	162	43	10.94	1.1	1.8	4797	2.01	108
781	464000	5158445	40.0	31.2	6.2	51	18.1	0.26	2.3	1.011	22.70	51	51	45667	163	50	13.15	1.3	0.8	2688	2.47	116
782	464672	5158310	3.0	36.4	6.1	35	18.3	0.09	4.4	0.641	5.57	23	22	9723	78	19	5.58	<0.3	<0.3	3080	1.34	79
783	465718	5159786	14.0	<10	6.2	51	18.3	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
784	467601	5159359	21.0	23.0	6.2	53	19.0	0.19	16.0	1.012	20.86	56	41	41946	161	50	8.10	1.1	1.6	1437	2.56	143
785	468073	5160075	34.0	23.7	6.2	52	18.7	0.22	5.6	1.064	24.83	54	43	49986	175	57	9.38	1.0	1.9	1723	2.15	136
786	469295	5162711	16.0	43.4	6.2	70	19.1	0.18	6.9	0.866	4.98	28	39	12159	179	22	12.94	0.8	0.8	3860	1.28	68
787	467962	5164117	1.0	74.6	5.9	33	18.1	0.14	8.1	1.372	4.74	17	66	3299	128	93	38.45	3.5	1.9	7561	0.51	71
788	468638	5164862	5.0	NS	6.2	54	18.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
789	465837	5166075	3.0	57.9	6.3	37	18.9	0.08	13.0	0.562	3.48	20	27	5500	58	22	5.06	<0.3	<0.3	3498	1.07	49
790	465416	5165504	1.0	78.9	5.5	22	19.0	0.13	12.0	0.550	3.49	19	17	7816	83	15	4.68	INF	INF	4047	1.05	23
791	464129	5165961	3.0	57.1	5.6	21	18.6	0.09	7.4	0.568	4.93	17	26	6139	45	19	4.68	<0.3	<0.3	3729	0.99	58
792	464002	5166509	8.0	58.6	4.5	16	17.9	0.08	2.2	0.490	2.15	11	21	3889	42	11	3.49	2.8	1.4	3303	0.97	40
793	462396	5167047	14.0	50.2	5.2	37	18.4	0.21	3.1	0.469	6.14	20	30	19473	90	22	14.02	<0.3	<0.3	3810	1.89	43
794	463379	5166163	8.0	59.2	4.4	21	18.9	0.15	3.0	0.733	4.56	14	38	9907	59	17	4.33	<0.3	<0.3	6119	1.39	67
795	462078	5165334	1.0	40.6	4.8	93	16.9	0.10	2.7	0.581	6.64	29	28	9488	154	18	5.13	0.6	<0.3	3246	2.34	24
796	462372	5164037	2.0	48.7	4.6	44	17.6	0.06	2.3	0.451	2.14	12	22	4414	47	15	1.71	<0.3	<0.3	3102	0.59	37
797	462789	5163689	2.0	33.2	4.8	22	18.4	0.07	2.8	0.356	3.74	15	38	2100	39	17	2.45	<0.3	<0.3	3233	2.66	25
798	462321	5163311	10.0	65.4	4.7	18	18.4	0.11	1.8	0.574	3.93	14	31	7443	50	15	3.25	INF	INF	5607	0.64	64
799	461430	5163572	1.0	50.3	4.5	22	18.9	0.11	0.8	0.718	5.89	32	27	7291	53	29	9.01	0.9	1.4	3808	1.32	55
800	461029	5163000	1.0	NS	4.3	26	19.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
801	462322	5163312	11.0	64.5	4.6	18	18.0	0.11	1.5	0.539	3.02	14	33	8648	56	15	3.01	<0.3	1.1	5058	0.56	66
802	463736	5163415	NM	42.3	4.6	26	18.4	0.08	1.0	0.475	2.56	18	23	3197	44	17	3.79	<0.3	<0.3	3163	0.86	37
803	463359	5161651	1.0	41.0	4.5	25	18.5	0.07	1.3	0.342	2.83	19	23	3100	46	25	6.32	0.5	1.4	3010	0.79	15
804	462780	5161617	1.0	47.8	4.6	34	18.8	0.06	1.6	0.428	3.10	18	23	3952	52	19	4.12	<0.3	<0.3	3065	0.96	34
805	462209	5161385	4.0	45.6	4.9	89	19.5	0.08	1.3	0.513	4.03	26	25	3481	76	25	2.86	<0.3	<0.3	3113	0.88	46
806	532173	5177834	4.0	44.0	7.4	100	18.3	0.09	2.6	0.534	6.71	22	33	6788	44	29	4.22	0.7	<0.3	3295	1.18	54
807	531780	5178500	4.0	37.4	6.8	31	18.9	0.12	2.8	0.520	11.88	27	32	10845	51	24	4.72	0.8	0.8	2887	1.33	54
808	533057	5178489	6.0	42.5	6.7	30	19.1	0.15	4.8	0.975	10.16	29	45	21200	78	26	5.38	1.1	1.9	3442	1.42	88
809	532200	5180560	8.0	47.5	6.7	25	19.2	0.15	9.0	0.806	13.74	31	51	15755	55	27	5.07	1.6	1.5	6789	2.88	78
810	532708	5180530	6.0	36.5	6.5	25	18.8	0.13	4.6	0.652	7.32	33	38	13636	71	27	7.30	0.8	0.9	2791	1.21	68
811	534349	5179878	13.0	NS	6.6	32	18.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
812	535678	5180668	8.0	40.4	6.3	26	19.5	0.18	4.5	0.742	21.65	37	91	28036	40	34	5.00	1.8	1.6	3736	3.29	116
813	536136	5180128	4.0	59.5	5.5	27	19.3	0.07	1.6	0.487	10.00	10	51	1850	41	36	3.46	INF	INF	5020	1.37	59
814	536907	5180511	1.0	58.5	5.0	25	19.2	0.09	2.1	0.491	4.64	19	43	6551	26	25	4.53	0.9	0.8	3389	1.58	17
815	537662	5178048	13.0	44.9	5.6	23	19.6	0.10	2.9	0.625	7.73	28	43	13602	66	27	7.43	2.1	2.4	4343	1.92	69
816	538098	5180032	0.8	55.7	5.7	25	19.6	0.14	3.4	0.616	10.01	24	56	14754	42	35	6.81	1.3	1.9	4847	2.8	67
817	537494	5181419	15.0	23.0	5.2	26	18.5	0.12	3.0	0.661	8.92	35	61	13979	57	27	4.46	1.6	2.1	2062	3.35	90
818	536145	5182591	2.0	68.7	4.9	27	19.3	0.19	2.4	0.677	3.83	17	75	4926	45	19	3.03	INF	INF	5314	1.79	81
819	534664	5182705	5.0	49.7	4.6	29	19.8	0.11	1.7	0.431	7.19	14	81	1816	35	22	1.98	1.6	1.7	5035	2.28	45
820	534226	5181934	2.0	56.0	5.4	33	19.6	0.22	4.3	0.645	12.99	23	85	9810	55	35	7.20	INF	INF	6748	3.09	82
822	532009	5183577	28.0	39.3	5.7	27	19.5	0.33	9.1	1.350	65.47	48	51	96235	94	42	11.12	1.4	1.3	2409	4.02	143
823	533361	5183530	17.0	48.6	5.3	26	19.6	0.29	4.1	1.112	21.76	41	86	9934	53	37	9.72	INF	INF	4457	1.9	115
824	533758	5183364	4.0	47.0	5.6	28	19.6	0.24	4.6	0.628	15.83	31	84	14655	48	40	10.39	2.2	2.4	5314	2.62	83
825	534037	5183666	2.0	59.0	5.6	29	19.9	0.26	5.1	0.914	17.40	30	117	15527	74	44	8.83	INF	INF	5545	3.43	118
826	533653	5185025	0.3	NS	5.1	22	18.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
827	533277	5186170	15.0	NS	5.6	27	19.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
828	534933	5185616	0.2	49.4	4.1	38	18.6	0.22	1.3	0.409	2.99	19	63	2382	29	17	4.71	0.8	0.7	2773	4.37	11
829	535186	5184450	20.0	24.4	5.0	27	19.6	0.28	3.0	0.366	13.04	41	114	27974	56	25	5.56	INF	INF	2085	4.28	74
830	535764	5183748	4.0	20.4	5.3	27	20.4	0.11	2.1	0.305	9.37	38	48	19096	53	31	3.84	1.0	1.9	1966	2.72	61
831	536514	5184403	18.0	28.5	4.8	26	18.5	0.19	4.9	1.234	13.97	44	95	23078	58	41	6.54	2.6	3.1	2431	4.31	127
832	537778	5186566	36.0	41.2	4.8	26	18.3	0.29	7.2	1.508	29.71	42	90	23073	69	40	12.46	2.1	2.4	3321	5.1	130
833	537294	5187034	13.0	53.1	5.3	24	19.1	0.29	14.0	1.691	16.18	31	94	14087	49	129	43.66	7.7	4.0	7392	2.92	136
834	536589	5186516	2.0	65.9	4.9	17	18.6	0.08	2.3	0.503	3.51	8	32	2922	36	21	2.78	INF	INF	3867	1.83	41
835	535934	5187327	2.0	NS	5.3	25	18.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
836	537581	5188508	10.0	36.7	5.6	27	19.2	0.17	7.5	1.025	24.15	36	50	30622	50	34	12.97	INF	INF	2900	2.94	96
837	537990	5188855	0.8	20.7	5.6	27	19.1	0.12	4.5	0.613	11.95	37	32	15620	67	28	7.35	1.4	1.2	2890	2.32	85
838	537156	5190653	5.0	54.0	5.1	22	19.2	0.17	INF	0.490	3.13	14	64	4332	45	16	3.47	INF	INF	4094	2.16	56
839	535568	5191569	3.0	56.6	5.5	22	19.7	0.14	5.0	0.602	7.25	21	33	15043	42	27	7.63	INF	INF	5068	1.43	71
840	535645	5189634	4.0	63.6	5.8	30	19.8	0.12	3.3	0.436	4.36	12	50	3133	57	11	3.46	1.2	0.8	7583	4.16	40
841	534492	5190123	5.0	38.9	5.8	29	19.7	0.16	4.9	0.519	12.49	41	70	26336	74	25	4.80	1.2	3.9	2945	5.75	81

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method------------------->		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit-------->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units------------------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
842	534029	5191976	2.0	67.1	5.9	25	19.8	0.10	4.0	0.954	12.26	28	54	21688	48	25	4.50	INF	INF	6646	2.83	102
843	533005	5191361	1.0	70.1	5.7	24	19.6	0.07	1.9	0.670	8.30	16	37	4823	50	30	4.97	INF	INF	4984	2.95	48
844	532098	5191139	14.0	26.7	5.8	29	19.4	0.07	3.2	0.485	7.66	28	28	13570	88	19	6.91	1.3	1.9	2162	3.11	56
845	531060	5191890	3.0	64.6	5.2	19	19.6	0.11	4.8	1.086	13.60	19	44	8569	53	29	6.30	INF	INF	5444	3.41	103
846	531047	5190816	6.0	48.6	4.8	24	19.7	0.08	3.3	0.686	6.41	23	32	10004	40	20	4.94	0.6	0.7	3084	3.64	46
847	530376	5191203	5.0	36.8	4.2	30	19.5	0.07	INF	0.707	9.86	20	20	6066	114	15	3.91	INF	INF	6203	2.74	61
848	530167	5190520	4.0	47.0	4.1	33	19.5	0.06	2.2	0.526	3.91	14	23	3190	37	21	3.96	<0.3	<0.3	2998	2.02	39
849	529569	5190884	4.0	54.8	4.1	30	19.0	0.10	1.4	0.676	2.48	11	24	3634	36	13	4.13	INF	INF	3665	2.04	50
850	529119	5190710	18.0	54.0	4.1	29	19.4	0.13	3.4	0.415	7.56	22	36	18327	45	15	9.89	<0.3	<0.3	3355	2.54	36
851	529548	5191509	0.6	39.6	4.3	30	20.1	0.06	2.0	0.441	5.90	18	19	5912	45	17	5.58	0.6	1.8	2212	1.95	17
852	527761	5191672	13.0	32.2	4.1	32	18.8	0.04	1.5	0.483	4.85	23	65	4297	44	16	4.14	0.8	1.6	2631	3.56	35
853	527377	5192046	13.0	19.9	4.3	29	20.0	0.04	3.3	0.418	13.55	28	28	11944	64	24	4.19	0.8	1.5	2255	3.34	63
854	526663	5191131	13.0	NS	4.7	26	18.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
855	527882	5188836	45.0	27.9	4.6	27	19.2	0.13	7.0	1.120	76.66	39	38	92166	102	34	9.69	1.2	1.9	1460	3.24	107
856	529473	5188317	1.0	55.0	4.0	37	20.6	0.03	2.1	0.342	2.34	9	15	1894	44	16	4.01	<0.3	<0.3	3305	1.24	10
857	529613	5188752	0.8	32.3	4.1	34	20.0	0.05	1.3	0.191	1.14	23	23	2330	27	16	4.02	<0.3	<0.3	2261	2.88	6
858	529174	5189074	1.0	48.2	4.1	33	20.0	0.08	3.8	0.632	5.72	24	31	4865	38	41	8.95	1.7	2.2	3668	2.05	29
858	529174	5189074	1.0	48.2	4.1	33	20.0	0.08	3.8	0.632	5.72	24	31	4865	38	41	8.95	2.0	3.3	3668	2.05	29
859	529335	5189825	4.0	59.8	4.1	32	19.9	0.10	3.6	0.915	4.60	11	32	2973	51	37	10.63	0.7	0.6	5226	1.71	55
860	531019	5189913	7.0	57.5	4.1	33	20.4	0.12	INF	0.789	7.55	24	33	7992	56	19	5.84	INF	INF	5114	2.23	59
861	531375	5190032	1.0	52.6	4.2	30	20.6	0.03	2.7	0.381	2.78	15	20	5148	38	18	4.55	0.6	0.7	2966	2.47	11
862	531947	5190078	6.0	45.5	5.2	29	20.2	0.12	8.4	1.546	12.83	27	52	15897	62	43	22.43	INF	INF	7448	4.49	104
863	532449	5190216	3.0	68.8	5.1	24	20.4	0.06	2.7	0.923	12.16	21	42	5137	45	24	2.96	INF	INF	4571	5.83	89
864	532895	5190025	4.0	52.7	5.0	23	20.3	0.06	INF	0.585	6.59	20	35	5746	43	21	6.69	INF	INF	3285	1.88	52
865	533363	5189431	12.0	47.3	5.4	25	20.2	0.16	5.4	0.814	8.09	30	58	13680	64	28	15.25	5.5	2.1	5165	3.57	81
866	531952	5188443	16.0	33.7	5.5	28	19.8	0.12	5.2	0.687	22.29	34	34	37955	69	27	10.35	1.5	1.9	2467	3.08	88
867	531612	5188655	2.0	58.8	5.2	24	19.8	0.09	5.9	1.000	7.90	15	34	7254	37	36	16.24	1.1	1.0	6488	3.57	45
868	530711	5188938	8.0	68.8	4.3	24	19.6	0.07	3.4	0.738	2.97	11	26	6870	47	17	4.38	<0.3	<0.3	5055	1.47	69
869	530362	5188797	1.2	48.7	4.1	32	19.6	0.06	1.5	0.321	1.37	16	22	2211	35	18	3.84	<0.3	<0.3	2647	2.38	7
870	530941	5188293	5.0	73.4	4.2	20	20.0	0.22	1.6	0.923	7.04	15	21	4620	33	18	3.72	INF	INF	3805	1.18	75
871	528242	5180169	10.0	67.1	5.0	17	19.4	0.07	7.1	0.630	6.86	17	30	12344	49	20	4.71	INF	INF	6558	1.01	71
872	527075	5179178	9.0	71.8	5.4	23	19.6	0.10	5.2	0.823	11.98	10	59	14841	56	13	3.72	INF	INF	8586	0.79	117
873	516374	5162959	17.0	60.5	6.8	151	20.5	0.20	35.0	1.023	10.56	20	149	15006	126	151	24.98	5.1	2.9	6897	0.59	108
874	516016	5162730	6.0	75.4	7.1	233	20.5	0.07	11.0	0.854	4.96	17	39	3915	233	47	5.70	INF	INF	6914	0.58	123
875	516191	5162442	15.0	73.5	7.0	85	20.3	0.14	8.0	1.160	5.59	15	41	10744	62	40	5.56	1.2	1.1	5999	0.43	147
876	526802	5171520	3.0	54.5	7.1	37	18.9	0.04	1.7	0.469	2.09	8	35	2754	74	14	1.72	0.9	1.3	4039	1	26
877	527726	5171422	4.0	58.6	6.0	21	11.9	0.07	INF	0.897	2.60	6	55	4524	43	45	5.39	INF	INF	5588	0.77	88
878	528751	5172092	4.0	65.3	5.5	23	16.5	0.10	2.7	0.746	4.35	10	57	8800	62	13	2.42	<0.3	<0.3	7267	1.21	69
879	528078	5172557	4.0	52.0	5.5	25	18.3	0.11	2.4	0.563	4.04	16	45	5192	46	24	3.84	1.7	1.7	3823	1.72	42
880	527575	5174626	3.0	72.3	5.0	19	16.8	0.04	1.9	0.546	2.55	5	33	1305	41	23	2.38	0.8	0.6	4458	0.66	45
881	527878	5173902	0.4	16.0	3.9	34	20.5	0.04	1.8	0.131	3.76	19	17	3122	40	14	5.53	0.5	0.7	864	1.67	11
882	528000	5173376	0.6	26.3	4.0	31	20.8	0.04	<0.5	0.122	2.74	18	19	4933	47	13	2.97	0.6	1.5	1529	1.8	11
883	528564	5174210	6.0	63.6	4.7	20	18.6	0.11	2.5	0.686	2.61	12	61	7815	47	14	2.42	0.9	1.8	4617	1.98	72
884	529000	5173981	3.0	45.7	4.4	28	19.8	0.06	4.0	0.506	7.44	24	41	7190	42	28	4.34	1.0	2.0	2892	1.44	44
885	532007	5176423	6.0	53.7	5.4	32	19.9	0.11	5.4	0.555	10.40	16	41	14252	49	31	9.24	1.6	2.3	6295	2.47	55
886	530080	5178693	13.0	21.5	5.6	26	19.6	0.10	5.7	0.797	21.08	50	37	32648	163	38	6.25	1.1	1.7	1376	3.25	114
887	529815	5180664	14.0	14.6	5.7	26	19.8	0.06	3.8	0.494	18.04	44	22	24956	200	34	5.39	0.6	2.2	983	1.98	87
888	529312	5182994	4.0	54.1	4.5	26	20.0	0.06	2.2	0.574	2.90	12	22	2771	52	17	3.15	0.4	1.4	3412	3.58	34
889	529555	5183938	7.0	54.6	4.3	27	19.5	0.10	3.9	0.566	5.48	15	31	7111	62	23	9.21	1.2	2.2	4277	2.14	50
890	529925	5184555	4.0	55.2	4.3	26	20.5	0.07	3.0	0.606	5.89	16	39	4474	84	22	4.77	1.0	2.1	6583	3.91	45
891	529259	5185310	0.2	NS	5.0	25	23.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
892	529953	5185868	9.0	40.0	5.1	22	20.4	0.11	6.4	1.032	11.24	32	66	11772	47	21	9.06	1.1	3.2	2643	2.04	93
893	529188	5186377	4.0	61.0	4.6	25	21.0	0.08	4.1	0.736	10.90	22	46	8590	42	23	3.28	0.9	1.7	5287	2.62	74
894	527886	5186339	3.0	43.6	4.1	33	20.8	0.04	2.1	0.470	6.50	14	14	3803	31	19	3.08	<0.3	1.3	2690	3.05	36
895	528120	5187216	7.0	47.1	4.1	33	20.2	0.09	4.1	1.024	36.38	32	30	12134	39	26	6.08	1.1	1.6	3768	5.2	67
896	528729	5187598	7.0	54.1	4.0	34	19.1	0.05	2.1	1.030	3.63	19	22	5068	32	17	3.22	<0.3	<0.3	3640	2.35	72
897	529574	5187554	4.0	46.8	4.2	33	19.8	0.10	1.8	0.590	4.25	16	43	2858	34	17	3.71	<0.3	1.0	3761	2.68	42
898	530558	5188370	6.0	69.0	4.0	31	18.4	0.05	1.7	0.586	2.47	11	20	5489	42	12	3.12	<0.3	<0.3	3486	1.46	53
899	530703	5188186	4.0	63.4	4.2	26	20.2	0.07	2.0	0.846	2.64	12	27	3342	38	19	4.78	0.4	1.5	4693	2.03	56
900	530673	5187769	5.0	52.3	4.1	29	19.5	0.06	1.7	0.610	2.43	13	23	3029	35	15	3.73	0.3	1.6	3532	1.6	35
901	531841	5187146	0.8	50.6	4.2	30	21.8	0.12	3.6	0.984	6.50	21	39	5493	33	40	16.21	0.8	1.6	4284	3.85	32
902	531708	5186498	2.0	48.2	4.4	27	21.6	0.06	2.4	0.292	1.97	15	31	2662	27	25	7.17	0.9	1.4	3199	1.92	8
903	530882	5184525	9.0	60.1	4.5	16	20.0	0.13	4.4	0.816	7.70	23	35	13320	39	23	11.27	0.9	1.5	5336	1.04	71
904	531951	5181316	3.0	28.9	5.5	33	21.0	0.14	INF	0.308	12.42	18	54	7202	35	23	3.25	INF	INF	6309	5.03	30
905	534533	5176853	35.0	25.6	6.0	34	19.8	0.09	10.0	0.855	26.25	33	53	32636	115	43	10.30	1.8	2.7	2668	1.9	101
906	536085	5176864	27.0	38.7	6.1	34	20.0	0.12	3.7	0.515	5.39	26	52	9063	93	31	8.99	1.8	2.5	3559	1.48	44
907	538143	5177318	20.0	49.5	6.0	30	20.0	0.17	4.0	0.828	21.25	39	71	15573	70	29	9.23	3.0	3.2	5544	2.05	77
908	537472	5177065	2.0	50.7	5.9	31	22.5	0.06	2.6	0.578	8.37	21	56	6347	37	33	5.35	2.4	1.3	5643	1.93	57
909	538116	5176380	5.0	70.7	6.1	35	20.9	0.06	3.6	0.767	8.25	23	60	8909	60	39	3.57	INF	INF	8378	2.16	84
910	537677	5176560	2.0	55.5	6.0	36	21.5	0.03	3.1	0.609	9.19	22	52	8659	51	35	4.08	1.3	1.5	6446	1.96	56
912	537620	5175393	0.6	35.3	4.4	23	21.3	0.08	0.9	0.194	4.04	23	25	5353	36	17	4.95	0.6	1.3	1656	2.06	15
913	535353	5175509	6.0	61.9	4.9	21	17.4	0.12	2.3	0.661	3.00	9	41	3911	50	14	2.03	<0.3	<0.3	4646	1.1	83
914	535467	5174654	5.0	37.2	4.2	30	19.7	0.10	2.0	0.481	9.44	30	37	8736	29	22	3.90	1.0	1.8	2936	1.24	63
915	537201	5173857	2.0	47.2	4.0	30	20.6	0.08	1.3	0.386	3.01	13	25	3329	38	19	4.08	0.6	2.6	2357	0.84	18
916	537799	5174091	17.0	49.2	4.7	24	20.5	0.18	4.6	0.735	31.42	37	56	17922	69	34	8.55	1.2	2.1	4162	1.8	81
917	537901	5173393	2.0	45.6	4.5	24	21.3	0.08	3.4	0.535	8.50	21	40	5751	54	38	5.12	1.0	2.1	3476	1.16	65
918	537687	5172787	1.0	60.1	5.1	20	22.0	0.12	3.4	0.663	5.49	10	45	4365	36	46	9.19	1.7	1.1	3738	1.9	27
919	538137	5172150	0.9	52.0	5.4	25	21.3	0.14	13.0	1.384	34.66	12	81	7986	91	107	32.09	3.6	3.6	5527	1.29	46
920	537788	5171753	2.0	44.2	5.1	21	23.0	0.12	1.6	0.429	3.31	18	71	4540	50	23	4.84	1.2	1.9	2031	4.72	11
921	537068	5171441	1.0	31.6	5.1	23	22.5	0.07	2.3	0.402	9.64	22	29	8789	91	47	5.92	1.0	1.4	2617	1.8	37
922	537821	5170749	18.0	58.0	5.7	24	19.9	0.30	4.5	0.497	27.58	26	48	26814	72	22	9.09	0.9	1.8	3772	1.42	55
923	537089	5170280	1.0	42.4	5.0	26	23.2	0.17	2.3	0.347	4.10	29	77	2162	32	23	5.25	1.6	2.1	1861	8.05	11
924	536735	5170646	1.0	72.2	4.4	26	23.2	0.11	2.6	0.619	5.47	10	48	2572	39	43	8.80	0.8	1.7	4230	2.71	34
925	536100	5170808	6.0	62.0	4.9	25	21.4	0.10	3.6	0.773	11.82	17	44	6472	38	29	3.80	0.9	1.0	5154	1.06	81

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method--------->		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit----->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units---------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
926	530331	5171895	1.0	63.9	4.2	31	23.5	0.08	2.9	0.510	4.27	10	35	2319	55	34	6.26	1.1	1.5	3467	1.2	17
927	529736	5171776	1.0	26.5	6.5	45	20.6	0.17	4.1	0.271	13.62	28	81	7578	55	35	6.34	3.2	2.6	4372	4.42	24
928	529723	5171021	4.0	90.2	5.0	13	20.4	0.04	INF	0.625	1.76	6	14	2264	24	19	5.00	INF	INF	3642	0.18	62
929	529809	5170703	4.0	41.6	5.9	32	19.8	0.07	2.8	0.410	6.04	27	33	10748	64	23	3.89	1.1	1.8	2606	1.29	48
930	531555	5171374	3.0	61.4	5.6	30	18.8	0.06	1.5	0.796	2.25	6	35	2344	47	15	1.59	<0.3	<0.3	4508	0.8	87
931	532201	5171620	6.0	69.3	5.3	25	19.0	0.09	3.4	0.735	3.92	12	43	6399	43	13	3.00	0.6	1.4	4319	1.1	54
932	532876	5171945	2.0	53.0	4.6	24	20.0	0.04	1.7	0.352	2.15	13	21	1286	55	20	3.46	0.7	1.8	3735	1.31	10
933	534211	5171807	43.0	<10	5.9	35	19.6	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
934	533492	5170616	11.0	58.4	6.0	35	19.4	0.11	4.1	0.783	7.64	18	58	5762	67	41	10.47	1.5	1.9	5213	1.39	63
935	534934	5170961	9.0	20.1	6.0	35	19.4	0.06	5.3	0.328	7.28	30	67	13082	124	33	4.25	2.1	1.2	6107	1.84	38
936	535398	5169648	6.0	54.1	6.2	35	20.0	0.13	4.6	0.613	7.26	25	71	6625	62	44	8.01	2.6	1.6	5880	2.09	67
937	536050	5169987	1.0	88.2	6.3	47	21.0	0.09	3.2	0.428	2.44	8	73	3263	30	35	5.88	1.2	<0.3	5046	1.42	13
938	536896	5169116	1.0	50.6	5.9	30	19.8	0.10	3.4	0.437	10.68	28	53	5959	65	26	2.46	1.1	1.6	5489	2.42	62
972	538107	5168547	1.0	29.9	5.0	32	21.8	0.06	2.6	0.251	3.61	30	96	4843	66	25	6.64	2.6	2.4	1515	6.6	11
973	537922	5168888	1.0	24.6	4.9	21	21.2	0.02	1.8	0.229	2.31	21	35	2796	39	16	4.57	0.9	1.7	1133	2.64	13
974	537030	5167707	1.0	12.0	4.7	32	21.0	<0.02	1.5	0.097	3.70	29	10	7884	61	15	5.36	0.3	0.9	619	0.95	16
975	537086	5168188	1.0	NS	4.8	29	21.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
976	530116	5169326	8.0	74.7	4.9	23	19.8	0.03	5.2	0.770	4.27	12	46	5588	53	36	6.46	2.4	2.9	5593	0.53	99
977	517520	5164534	2.0	NS	6.2	123	21.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
978	517096	5164326	2.0	NS	7.5	313	21.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
979	516844	5164209	18.0	63.6	7.6	368	20.8	<0.02	138.0	0.744	4.97	54	92	4544	268	73	12.50	26.7	5.3	10820	24.1	97
980	529486	5169580	3.0	51.8	7.7	200	23.9	<0.02	4.0	0.606	8.10	14	69	3584	52	30	5.59	1.9	0.8	7735	3.87	54
981	529960	5169050	NM	64.0	6.8	36	22.5	<0.02	3.5	0.664	5.67	18	33	4326	45	27	3.21	0.8	0.6	3865	0.85	62
982	531006	5169476	1.0	55.8	6.4	40	23.0	<0.02	5.2	0.704	5.60	29	42	16127	52	32	5.68	1.4	2.9	4300	0.94	53
983	530843	5169683	3.0	41.9	6.4	37	21.9	0.05	3.9	0.417	5.38	30	27	17178	64	22	3.48	1.1	2.6	2655	0.94	52
984	533672	5169243	5.0	66.8	6.0	30	22.2	0.10	2.1	0.538	3.65	9	38	2788	57	15	2.17	<0.3	<0.3	5025	0.98	60
985	534049	5168051	5.0	15.7	6.1	36	21.7	0.05	4.4	0.423	14.38	39	31	18594	95	35	4.98	0.8	1.7	2812	1.92	65
986	534882	5167943	3.0	59.0	6.3	34	22.2	0.14	3.7	0.785	6.28	23	68	5203	53	39	6.57	1.6	1.0	5742	1.68	79
987	535453	5167874	1.0	90.0	5.4	31	22.7	0.06	3.9	0.473	4.52	<4	27	6254	38	46	6.31	<0.3	<0.3	5369	0.84	23
988	536786	5167196	3.0	63.3	4.6	32	20.5	0.05	2.6	0.442	2.74	8	36	2899	52	15	1.98	0.7	2.2	3970	0.87	31
989	537166	5167198	1.0	NS	4.5	23	23.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
990	537581	5168198	NM	NS	5.1	27	23.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
991	538213	5167669	4.0	46.3	5.2	22	23.4	0.10	3.9	0.612	5.34	20	46	7208	63	46	9.23	2.4	2.5	4409	1.24	49
1030	538070	5165065	0.8	22.4	6.1	33	25.6	0.11	11.0	0.598	12.96	32	50	13612	52	67	16.89	2.3	3.6	1943	1.82	41
1033	533554	5162016	5.0	47.8	4.6	24	25.2	0.09	3.4	0.357	4.09	25	38	5804	70	26	4.54	0.9	0.6	2730	1.33	38
1034	532394	5161850	3.0	NS	4.1	20	26.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1035	525633	5162502	4.0	55.8	4.8	25	25.4	0.08	2.6	0.517	3.30	18	38	2491	51	30	2.98	1.0	<0.3	4262	1.82	41
1036	524890	5163320	0.3	NS	5.7	32	26.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1037	499039	5139279	5.0	20.9	7.5	204	20.5	0.14	4.0	0.692	14.97	58	46	20448	263	61	8.30	1.4	2.2	1637	2.29	115
1038	495201	5137029	10.0	20.4	7.4	182	20.0	0.17	7.5	1.685	27.52	69	53	38545	206	86	8.34	2.0	4.9	1269	6.02	215
1039	493484	5135248	7.0	NS	7.4	159	20.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1040	490404	5132476	10.0	19.7	7.3	147	20.4	0.12	4.9	0.829	18.07	54	32	30921	169	63	5.70	0.9	1.0	1321	3.83	142
1041	488442	5129968	17.0	26.3	7.2	133	20.2	0.19	167.0	2.583	27.54	80	73	38614	188	74	11.84	2.7	2.8	1605	11.8	228
1042	490286	5128886	1.0	48.5	6.5	46	20.7	0.15	2.5	0.435	2.02	38	41	5080	75	22	8.68	1.0	1.7	1826	4.61	11
1043	489852	5128569	1.0	76.9	5.8	29	20.9	0.08	6.1	0.520	4.38	13	41	3514	52	51	7.64	1.8	1.1	4425	1.79	14
1044	489873	5127715	6.0	66.8	5.5	24	21.0	0.16	4.6	0.927	3.07	19	69	9700	92	19	4.12	0.7	<0.3	4783	1.09	133
1045	487607	5127146	5.0	45.1	5.6	24	20.4	0.11	3.9	0.744	8.01	35	30	11050	107	29	6.22	1.4	2.9	2617	1.06	76
1046	488326	5127269	1.0	NS	5.4	25	19.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1047	486636	5126719	5.0	53.0	5.3	27	20.1	0.12	2.7	0.610	4.23	24	31	9218	81	23	4.20	INF	INF	3824	0.92	65
1048	486604	5126225	8.0	60.6	4.7	28	19.5	0.14	2.2	0.806	4.34	19	51	10185	105	20	3.84	<0.3	<0.3	5423	0.92	144
1049	486200	5125723	4.0	51.1	4.7	26	19.9	0.10	1.8	0.718	4.83	26	31	9757	123	18	4.50	0.6	2.3	3541	0.89	99
1050	486295	5124938	9.0	45.6	4.6	28	19.1	0.15	2.8	0.399	5.14	33	29	13386	143	24	6.67	0.7	<0.3	2925	1.19	55
1051	485603	5124420	27.0	41.4	5.5	31	21.2	0.16	4.1	0.903	15.67	53	44	23196	166	34	10.29	1.3	3.2	2939	1.88	108
1052	487323	5125036	6.0	70.6	4.5	27	20.8	0.06	1.3	0.764	2.44	11	32	5746	75	11	2.31	<0.3	<0.3	4077	0.54	77
1053	487482	5124383	8.0	78.1	4.1	25	20.3	0.04	1.8	0.803	2.28	8	24	3640	57	10	1.86	NS	NS	4155	0.61	54
1054	486833	5124096	7.0	64.6	4.2	25	20.6	0.05	2.0	0.849	3.28	13	28	4482	68	14	2.53	<0.3	<0.3	4055	0.79	62
1055	485618	5123787	4.0	18.6	4.9	31	21.0	0.05	2.2	0.488	11.40	37	22	14386	142	32	4.30	0.8	0.6	1251	1.24	82
1056	484340	5122078	9.0	14.1	5.3	32	20.7	0.03	1.6	0.277	7.54	35	20	11544	137	28	4.42	<0.3	1.0	1223	1.42	81
1057	486933	5122510	5.0	39.1	5.3	29	20.9	0.07	2.4	0.596	9.78	36	28	13071	103	28	5.79	<0.3	<0.3	2255	1.09	76
1058	487754	5122506	7.0	39.1	5.4	26	21.3	0.08	2.9	0.795	8.59	31	39	9828	82	31	5.49	2.4	3.3	4079	1.01	70
1059	488332	5122337	4.0	16.9	5.2	26	21.1	0.08	2.0	0.428	20.13	50	23	20333	175	46	5.21	<0.3	0.6	1578	3.46	144
1060	489326	5123463	10.0	21.4	4.8	27	21.4	0.11	1.9	0.429	14.91	52	24	21108	173	37	7.72	0.5	1.4	1123	2.21	88
1061	490387	5123736	3.0	43.4	5.0	26	21.2	0.12	INF	0.507	5.16	35	36	9872	125	33	5.14	INF	INF	2854	2.54	58
1062	491203	5121934	1.0	22.3	4.7	26	20.9	0.03	2.2	0.238	3.56	30	15	7328	75	21	5.46	0.6	1.8	1151	2.08	17
1063	491131	5123499	2.0	42.0	4.3	29	21.0	0.09	1.4	0.620	3.80	27	25	7755	213	24	5.19	0.6	<0.3	2687	2.32	60
1064	491174	5124742	3.0	NS	4.2	27	20.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1065	488225	5124375	4.0	62.6	4.4	29	17.1	0.10	1.9	0.725	2.15	10	35	4474	88	15	2.68	<0.3	<0.3	4726	0.78	78
1066	488470	5124800	2.0	63.7	4.1	29	16.3	0.09	1.9	0.782	2.57	11	31	4325	91	18	2.80	0.7	2.2	3892	0.71	67
1067	489050	5125009	3.0	44.4	4.0	29	18.6	0.09	1.7	0.468	3.86	27	28	6694	73	25	4.84	INF	INF	2676	0.95	48
1068	489312	5125712	15.0	58.6	4.3	26	20.5	0.12	3.6	0.781	9.52	28	34	11268	81	28	5.85	0.8	<0.3	4517	1.24	78
1069	489941	5126209	6.0	48.6	4.7	25	20.8	0.43	29.0	2.593	16.34	30	229	16890	99	280	54.94	INF	INF	11461	1.21	133
1070	490593	5126359	0.5	31.0	4.7	27	21.3	0.24	6.0	0.596	7.16	58	60	15114	150	70	16.88	2.4	2.8	1623	4.44	35
1071	489941	5126980	9.0	55.5	5.0	25	21.0	0.12	7.1	0.901	7.63	30	57	9128	81	69	12.12	2.3	1.9	4893	1.25	82
1072	490642	5127319	6.0	51.8	5.2	25	21.1	0.12	10.0	1.165	12.51	33	79	18646	85	96	15.32	7.3	4.9	4956	1.32	117
1073	492494	5127501	31.0	37.5	4.2	26	20.5	0.14	5.5	0.679	14.76	41	35	19516	131	45	11.10	1.4	3.7	2665	7.03	84
1074	492364	5126221	9.0	43.5	4.0	28	20.3	0.14	4.6	0.610	4.07	24	28	8032	92	32	10.58	1.1	2.5	2665	3.64	51
1075	493758	5126636	8.0	33.8	4.1	29	20.9	0.09	2.3	0.568	10.23	38	31	13475	140	35	6.72	1.2	2.2	2162	5.38	78
1076	494473	5126800	5.0	55.9	3.9	25	18.4	0.12	2.8	0.857	3.58	17	39	6293	75	34	5.88	1.3	0.8	3832	5.87	69
1077	494019	5128369	9.0	34.3	4.1	26	20.6	0.11	2.6	0.659	8.28	35	35	12480	170	44	9.14	1.8	3.3	2141	5.1	78
1078	494713	5128784	1.0	NS	4.3	22	21.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1079	496093	5130252	4.0	47.2	4.5	25	21.4	0.10	3.5	0.673	5.97	29	38	7101	87	54	6.92	INF	INF	3472	6.15	67
1080	495246	5130460	11.0	54.1	4.2	28	20.1	0.11	2.4	0.499	2.91	14	33	8465	92	27	4.98	0.7	<0.3	3856	3.38	47
1081	494733	5130515	3.0	41.8	4.3	25	18.5	0.12	4.1	0.737	6.18	19	59	6612	76	89	9.99	3.0	4.2	3677	3.74	52
1082	494213	5129602	9.0	50.7	4.1	27	20.6	0.12	4.4	0.682	5.45	21	50	7109	69	69	8.24	2.6	2.2	4439	2.72	63

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method----------------->		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit------->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units----------------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
1083	493737	5129313	1.0	NS	4.0	23	22.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1084	493093	5129102	8.0	41.9	4.3	22	21.5	0.10	2.9	0.634	9.06	34	34	11519	87	38	7.12	1.4	0.8	3142	2.78	70
1085	491331	5130699	13.0	35.2	5.0	25	20.7	0.13	3.1	0.361	13.94	43	35	22471	210	40	8.60	1.4	1.0	2651	3.38	71
1086	492550	5130454	3.0	38.7	4.9	23	19.4	0.14	8.0	1.002	7.75	19	88	7664	71	146	17.12	4.5	3.0	5225	3.79	58
1087	493618	5130638	4.0	34.3	4.8	25	20.5	0.07	2.9	0.620	5.64	23	34	7179	62	53	7.41	1.2	2.3	2921	4.4	50
1088	493900	5131068	1.0	48.7	4.6	29	22.6	0.15	1.9	0.539	2.70	35	33	4869	60	15	5.55	1.0	<0.3	2218	35.1	13
1089	494781	5132204	10.0	34.8	4.3	26	21.2	0.06	4.4	0.633	8.81	38	40	12935	105	46	7.34	1.6	2.9	2495	10.1	92
1090	495040	5133133	2.0	44.0	4.6	24	19.1	0.14	8.2	1.022	6.44	15	91	5127	96	141	11.23	6.8	3.4	5538	8.77	52
1091	494516	5133706	12.0	22.4	5.2	42	21.0	0.11	5.1	0.565	12.72	53	50	21521	215	64	9.21	2.0	2.6	2300	5.47	88
1092	494909	5134642	4.0	57.9	5.2	43	21.2	0.08	4.2	0.852	17.27	42	62	10705	79	55	5.21	3.8	2.0	4740	1.51	105
1093	495078	5135451	1.0	NS	4.5	58	22.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1094	495320	5136013	1.0	81.3	5.0	49	22.4	0.30	20.0	1.295	12.27	39	256	11430	49	515	24.10	16.3	17.1	15517	1.75	44
1095	495773	5136194	1.0	93.3	4.4	31	23.3	0.06	3.0	0.249	3.11	8	39	2646	46	46	3.57	1.1	<0.3	3334	1.09	10
1096	496562	5137036	13.0	31.1	5.4	65	21.0	0.18	6.2	0.822	12.00	56	83	14578	142	94	10.19	4.4	3.8	2797	5.02	112
1097	498016	5135833	7.0	43.9	4.6	38	20.9	0.12	6.7	0.651	7.74	33	54	12762	100	79	9.63	2.7	2.6	3434	4.36	71
1098	498709	5136069	1.0	53.4	4.0	28	21.6	0.08	5.2	0.568	5.27	22	68	5899	72	82	9.55	4.8	2.3	3890	7.48	17
1099	499532	5136500	4.0	NS	5.3	30	20.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1100	500008	5137510	5.0	<10	5.4	39	21.2	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
1101	508358	5172322	15.0	60.6	4.2	27	21.7	0.07	3.3	0.954	6.76	20	43	5094	48	32	4.79	1.1	2.6	5269	0.96	81
1102	507381	5173698	3.0	60.2	3.8	32	21.5	0.16	14.0	2.579	18.54	50	124	16670	48	50	20.40	INF	INF	7004	2.72	771
1103	506231	5174194	1.0	NS	4.1	23	20.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1104	506609	5175257	3.0	76.1	4.1	NM	20.9	0.04	2.1	0.880	2.19	8	25	4346	46	16	2.03	0.6	2.0	3942	0.64	98
1105	507419	5175817	5.0	45.8	3.8	27	20.7	0.09	3.3	0.819	7.16	28	35	6643	57	24	7.65	0.9	0.7	3014	1.11	66
1106	506961	5177070	5.0	61.1	3.9	25	17.6	0.13	4.2	0.933	3.12	8	43	8183	51	26	6.12	0.9	<0.3	6768	0.8	131
1107	505568	5176458	1.0	41.1	5.1	61	19.1	0.06	8.4	0.392	3.42	15	35	4650	88	19	2.00	1.0	<0.3	7248	3.13	72
1108	505731	5175899	9.0	44.4	5.9	64	21.3	0.28	19.0	1.348	10.84	18	86	15537	185	101	35.24	4.0	3.8	8050	1.51	111
1109	505858	5175118	1.0	29.0	5.8	63	20.8	0.03	3.2	0.366	3.42	15	21	2959	71	22	3.54	0.6	<0.3	2544	1.63	49
1110	505873	5174467	1.0	61.6	5.6	61	21.0	0.03	1.6	0.532	2.40	11	22	3261	106	19	2.66	<0.3	<0.3	4018	2.22	13
1111	504492	5175437	9.0	51.7	5.0	28	21.4	0.10	1.9	0.929	3.10	16	28	5861	52	14	14.27	0.5	1.9	3744	0.99	99
1112	503499	5174577	4.0	72.0	4.2	76	20.6	0.12	2.7	1.181	2.64	6	51	4715	47	36	6.12	1.6	0.6	6022	0.58	160
1113	503330	5174632	1.0	90.5	4.9	59	20.7	0.10	4.6	0.703	3.16	5	35	3010	42	44	8.36	3.3	2.5	4280	1.65	21
1114	487808	5139079	3.0	NS	7.3	1170	18.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1115	484496	5138062	4.0	NS	7.4	1169	20.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1116	482814	5137308	8.0	NS	7.6	1039	20.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1117	478973	5137115	7.0	NS	7.5	363	20.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1118	474638	5135826	1.0	35.7	7.0	146	19.7	0.47	5.3	0.556	5.07	60	51	13032	220	39	12.20	1.3	1.8	1697	8	40
1119	474270	5129903	4.0	NS	7.2	234	19.7	NS	INF	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1120	470718	5130412	3.0	41.2	6.9	98	19.7	0.13	2.8	0.649	8.11	39	30	11899	120	37	5.64	1.0	2.1	2946	2.09	86
1121	471982	5128920	1.0	35.4	6.7	76	19.4	0.16	3.6	0.667	10.95	44	36	14803	149	45	6.00	1.0	2.1	3389	2.54	104
1122	473301	5128501	1.0	33.2	6.6	108	19.7	0.17	3.8	0.677	12.14	48	37	16998	189	61	8.62	1.0	2.1	2947	2.31	102
1123	473154	5125602	4.0	27.3	7.1	143	19.9	0.10	3.1	0.635	10.83	50	36	19266	214	45	7.74	1.3	2.3	3863	2.55	81
1124	471809	5125161	20.0	24.6	7.5	114	19.9	0.12	9.0	0.697	18.27	65	39	31280	271	51	10.30	1.7	2.2	2772	3.44	111
1125	470869	5124936	1.0	NS	5.9	28	18.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1126	470548	5125072	1.0	NS	6.1	39	20.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1127	471441	5122984	15.0	NS	6.6	61	18.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1128	467354	5123946	5.0	23.4	6.7	53	19.4	0.19	2.9	0.676	13.19	62	33	25047	156	52	8.78	0.6	1.7	2173	2.61	108
1129	464331	5122886	9.0	NS	6.9	65	20.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1130	463250	5124611	11.0	32.8	6.7	36	20.5	0.06	3.2	0.635	10.88	47	34	17135	114	36	6.36	1.6	2.5	2394	2.74	101
1131	463035	5125043	9.0	33.0	6.8	38	20.6	0.08	4.1	0.796	11.89	47	34	18336	128	37	9.67	1.4	2.6	3384	2.55	107
1132	462073	5124625	2.0	37.6	6.7	36	20.5	0.05	5.0	0.718	11.68	41	30	15722	224	37	7.30	2.1	2.1	4174	3.74	88
1133	462029	5125880	1.0	16.2	6.2	31	20.4	0.08	4.5	0.473	11.51	54	22	18712	123	37	12.59	<0.3	1.2	827	4.13	67
1134	462615	5126181	1.0	50.1	5.8	22	19.5	0.14	1.7	0.271	2.47	31	22	5643	98	20	7.84	0.6	2.3	2563	3.97	15
1135	461561	5127342	2.0	59.6	6.3	184	19.7	0.10	6.3	0.667	8.58	35	52	12095	244	58	6.17	1.6	2.5	10127	6.47	33
1136	461734	5128440	3.0	NS	6.8	282	20.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1137	461541	5131851	2.0	48.6	6.8	154	20.0	0.18	5.8	1.560	22.59	48	60	16582	123	60	6.60	1.6	2.8	6770	5.51	168
1138	462295	5131840	3.0	27.8	6.6	159	20.5	0.19	2.4	0.533	10.58	57	28	20789	391	44	10.10	0.7	2.1	1896	1.49	99
1139	463781	5133041	3.0	28.9	6.4	52	20.8	0.18	2.1	0.492	11.75	65	33	21813	174	51	9.58	0.6	1.9	2104	2.11	111
1140	463988	5127727	NM	NS	6.0	42	18.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1141	463438	5126314	1.0	39.3	5.6	25	18.8	0.26	5.3	0.429	5.62	54	65	12793	163	45	19.78	2.0	2.5	1715	6.16	27
1142	463659	5125418	5.0	58.5	5.8	38	19.4	0.10	3.5	0.738	4.93	21	36	6734	86	24	4.88	2.0	2.2	5166	1.48	80
1143	465495	5124712	5.0	21.9	6.4	45	19.9	0.07	5.5	0.672	18.54	56	33	22250	126	55	7.79	1.0	1.8	4666	4.25	104
1144	466771	5125175	6.0	20.1	6.8	46	20.7	0.08	7.6	0.669	23.36	55	32	23651	137	56	6.93	1.4	2.1	4058	4.72	111
1145	467393	5125564	2.0	55.5	6.2	38	19.8	0.08	2.2	0.864	5.86	15	29	4826	76	24	3.99	0.8	1.7	5415	1.76	77
1146	468302	5125911	3.0	41.9	6.0	46	18.9	0.12	3.9	0.529	10.94	41	32	15304	131	39	7.13	0.9	1.9	4585	1.93	94
1147	468556	5125388	1.0	63.6	6.3	75	19.5	0.07	2.6	0.511	6.15	22	22	6947	98	27	3.68	<0.3	<0.3	4758	1.56	57
1148	469289	5125566	1.0	66.4	6.4	83	19.3	0.04	3.0	0.520	6.61	12	22	3718	75	27	5.39	0.7	1.7	6545	1.77	61
1149	468249	5127115	1.0	27.5	6.3	47	20.1	0.12	2.1	0.378	4.96	43	23	10482	106	26	7.01	0.5	1.8	1504	2.77	30
1150	467202	5126960	1.0	12.9	5.0	22	20.1	0.24	2.8	0.408	4.77	40	46	9044	103	33	15.21	INF	INF	516	2.67	27
1151	466870	5126364	1.0	85.2	4.4	15	19.3	0.14	3.1	1.041	5.38	9	56	2156	34	48	15.21	3.0	2.5	5468	5.68	41
1152	466347	5126944	11.0	27.6	5.6	34	20.7	0.11	2.5	0.591	13.30	50	33	18414	129	44	9.97	1.3	0.9	2161	2.21	108
1153	465485	5126348	5.0	23.1	5.9	35	20.5	0.09	3.7	0.658	17.69	56	32	21112	116	49	7.04	1.3	2.0	2058	3.17	117
1154	465793	5127303	1.0	33.3	5.5	28	19.5	0.12	3.5	0.358	2.83	37	29	6713	92	19	9.05	0.7	2.0	1292	5.38	18
1155	466333	5127976	1.0	67.5	5.1	20	20.4	0.14	0.5	0.503	2.98	27	38	5519	69	30	8.66	2.8	2.6	4101	4.66	17
1157	467213	5128027	1.0	56.1	5.7	28	20.6	0.12	4.8	0.898	4.62	25	34	6157	84	30	14.79	1.0	2.0	4643	3.92	30
1158	467442	5128725	10.0	30.0	6.0	34	20.6	0.20	8.9	0.969	21.02	71	53	25703	227	59	8.63	2.4	2.9	2781	5.42	159
1159	465951	5128617	13.0	43.0	6.4	47	20.9	0.27	8.3	0.860	29.42	51	56	30499	174	39	9.08	2.3	2.5	4896	3.27	109
1160	467579	5129672	5.0	58.9	5.9	45	18.3	0.25	3.5	0.674	5.97	34	53	14822	139	31	6.24	1.3	1.7	4678	1.02	103
1161	468198	5129514	12.0	46.1	5.9	43	19.2	0.12	6.0	0.613	9.24	35	41	18670	146	34	8.53	2.5	2.3	7741	3.15	76
1162	469786	5132257	2.0	NS	6.7	312	20.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1163	468595	5135148	1.0	NS	6.2	120	19.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1164	467725	5135863	1.0	54.9	5.6	28	20.8	0.26	4.5	1.775	4.10	27	93	5331	63	40	16.00	2.5	3.0	4363	14.3	33
1165	469091	5135981	1.0	58.5	5.6	25	20.5	0.19	3.9	0.783	7.64	25	47	6902	101	42	6.31	1.7	2.2	6040	3.02	80
1166	471036	5136379	5.0	21.6	6.3	62	21.1	0.21	4.6	0.475	16.03	71	39	28955	279	55	12.13	1.3	1.8	1486	1.53	107
1167	470947	5137869	1.0	NS	6.2	57	20.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method------------------>		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit------->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units------------------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
1168	470940	5138891	2.0	16.8	6.1	55	20.1	0.09	2.8	0.606	21.50	36	82	17902	162	115	7.49	3.1	2.2	2985	1.56	84
1169	469223	5139890	1.0	NS	6.0	47	20.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1170	470673	5137441	1.0	24.1	5.9	68	20.0	0.14	4.5	0.891	11.82	45	78	16874	131	134	9.81	5.5	3.5	2115	2.56	65
1171	471198	5140373	10.0	25.5	6.1	55	21.0	0.29	3.4	0.829	16.96	45	37	25124	124	60	12.68	2.6	1.8	2220	1.66	121
1172	471678	5138895	1.0	NS	5.8	35	20.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1173	473109	5139445	1.0	53.2	6.3	554	20.8	0.23	8.5	1.799	19.51	24	179	4116	261	1466	20.02	4.9	8.4	4961	3.58	57
1174	474549	5140382	5.0	54.6	6.4	222	20.5	0.33	2.1	1.158	3.99	29	41	10046	160	31	6.78	1.0	2.2	4173	1.26	83
1175	470816	5141077	2.0	NS	6.5	193	20.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1176	470356	5141650	2.0	85.1	6.2	45	20.6	0.12	7.0	0.995	4.35	8	54	4601	43	67	16.93	4.8	3.9	8068	1.5	29
1177	467587	5140056	1.0	NS	6.3	41	20.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1178	466880	5139768	1.0	NS	6.3	52	21.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1179	467793	5138071	3.0	32.7	6.4	59	20.8	0.29	4.1	0.917	12.98	54	58	20359	154	75	8.66	1.4	2.1	2873	1.97	141
1180	465220	5136136	3.0	NS	6.3	47	22.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1181	463873	5135502	2.0	54.7	6.2	36	21.5	0.16	3.4	0.831	9.80	43	43	13915	149	50	10.50	1.2	<0.3	3344	1.72	93
1182	466822	5143484	3.0	69.0	6.0	26	20.4	0.23	4.0	1.123	1.77	9	19	5277	128	15	3.15	1.9	2.5	3616	0.61	65
1183	468062	5143372	11.0	NS	5.8	31	20.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1184	469631	5143927	3.0	NS	6.2	36	20.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1185	469745	5145146	4.0	49.0	6.2	41	20.7	0.24	4.1	1.125	4.96	23	31	9062	115	27	8.54	1.0	2.1	3559	1.56	96
1186	470321	5145684	3.0	18.6	6.3	52	20.8	0.17	4.2	0.661	9.00	38	28	18355	108	31	7.47	0.8	1.7	3191	1.52	91
1187	468654	5144856	12.0	10.5	6.7	60	20.3	0.24	10.0	0.789	10.85	43	35	23327	203	34	10.18	0.3	0.8	2092	1.73	118
1189	465328	5144974	14.0	12.9	6.8	59	19.4	0.23	20.0	1.182	14.48	49	42	47460	199	43	12.97	1.0	1.3	2595	2.41	159
1190	464539	5146028	2.0	NS	5.7	19	19.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1191	464760	5146685	4.0	65.1	5.7	17	20.1	0.25	3.3	1.609	4.01	12	25	5923	94	21	9.07	0.8	<0.3	4881	1.04	104
1192	463522	5147587	15.0	NS	6.6	50	20.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1193	461350	5148383	2.0	54.2	6.7	39	20.2	0.17	4.3	0.993	5.34	24	35	15304	139	26	7.56	1.3	0.7	7224	1.26	123
1194	461991	5149383	29.0	46.3	6.3	24	20.5	0.27	7.9	1.063	22.92	35	43	47450	134	28	28.72	1.2	2.8	5882	1.32	118
1195	461818	5149941	9.0	33.6	6.3	23	20.3	0.11	3.3	0.960	6.84	35	33	14477	156	28	10.21	1.0	2.2	2747	1.34	110
1196	462255	5149800	1.0	18.0	5.9	20	20.3	0.13	6.6	0.739	2.72	29	23	5641	71	20	14.75	INF	INF	822	5.06	21
1197	462382	5150434	5.0	51.5	5.9	20	20.0	0.16	3.4	1.179	6.30	24	35	9281	93	31	18.74	1.1	2.5	5016	1.17	138
1198	461811	5150471	3.0	62.5	5.8	20	19.9	0.12	1.9	0.808	3.12	12	34	4319	81	26	8.57	0.8	2.9	4907	0.98	73
1199	462395	5150960	8.0	53.2	5.9	26	19.7	0.09	1.8	1.243	2.76	13	25	3807	58	16	4.88	0.4	1.8	3898	1.19	120
1200	463064	5151366	3.0	53.5	5.8	24	20.2	0.09	2.5	1.030	6.91	18	21	3011	57	22	5.64	INF	INF	4151	2.27	83
1201	462250	5152102	4.0	48.2	5.7	23	20.2	0.08	1.0	0.849	2.02	10	22	4621	84	14	5.21	<0.3	<0.3	3575	1.05	62
1202	464166	5153682	2.0	60.8	5.8	22	19.6	0.04	2.0	1.279	5.47	17	21	5465	49	17	5.79	0.7	<0.3	4962	1.11	118
1203	463503	5153941	3.0	58.1	5.5	18	19.6	0.03	1.7	0.798	2.23	11	23	3250	66	14	5.21	<0.3	<0.3	3496	0.77	73
1204	463345	5154617	2.0	60.1	5.2	15	18.9	0.05	3.0	0.564	3.34	10	23	3607	59	26	6.97	<0.3	0.7	3609	0.82	23
1205	465872	5153941	15.0	59.9	5.2	18	18.8	0.18	2.1	0.811	2.26	12	40	6699	61	15	4.87	INF	INF	5146	0.94	62
1206	465361	5155523	4.0	55.9	4.6	19	18.9	0.10	1.7	0.646	2.34	11	28	5213	58	13	4.71	<0.3	<0.3	4163	0.87	61
1207	464795	5155449	2.0	42.6	4.7	19	18.8	0.05	1.7	0.517	2.84	9	20	3730	74	16	4.01	<0.3	<0.3	3235	0.76	55
1208	465568	5156602	13.0	29.4	5.1	23	19.6	0.07	2.4	0.473	7.31	28	19	10648	124	20	6.58	<0.3	0.6	1846	1.08	58
1209	463247	5156448	1.0	43.8	4.9	33	20.3	0.14	4.3	0.531	4.97	16	38	3472	39	42	14.78	2.0	0.9	4214	0.94	28
1210	461258	5154162	6.0	89.6	4.0	16	20.5	0.03	1.3	1.094	0.71	4	9	1535	25	5	2.50	INF	INF	3872	0.2	75
1211	461874	5154740	1.0	62.5	4.3	11	20.5	0.05	1.3	0.851	2.79	23	16	2842	49	16	4.62	INF	INF	3335	0.46	85
1212	461713	5155725	23.0	47.3	4.9	16	20.3	0.08	2.9	0.688	13.33	16	26	18369	44	15	4.98	0.4	1.6	7323	0.8	57
1213	462480	5160196	9.0	53.8	5.0	18	19.6	0.09	1.1	0.748	7.63	33	40	7938	59	25	3.48	<0.3	<0.3	5888	1.05	77
1214	462975	5161178	5.0	48.1	4.8	29	19.8	0.06	1.7	0.706	3.12	25	25	5334	63	21	3.09	INF	INF	3348	0.74	59
1215	465704	5158040	9.0	61.4	4.6	27	19.8	0.12	3.2	0.812	4.96	16	26	11502	47	17	4.04	<0.3	1.6	7408	1.13	86
1216	465209	5157948	7.0	42.7	5.2	17	20.4	0.10	2.0	0.809	5.18	16	18	5578	55	12	3.85	<0.3	<0.3	3485	1.27	83
1217	466695	5158110	4.0	47.5	5.2	20	20.1	0.09	2.1	0.601	6.44	18	22	8348	70	15	4.32	<0.3	<0.3	3068	1.24	57
1218	467369	5157862	15.0	42.3	5.1	21	20.1	0.46	18.0	1.712	18.14	25	104	17687	84	122	85.83	INF	INF	8567	1.12	139
1219	479367	5161284	1.0	36.4	7.1	165	16.6	0.25	3.8	0.899	3.46	38	36	8508	94	30	6.20	0.9	1.5	2189	3.42	30
1220	474512	5163544	3.0	57.4	6.8	45	17.5	0.05	1.9	0.712	3.63	9	23	2387	47	19	3.11	<0.3	<0.3	3828	0.61	67
1221	473979	5163591	9.0	17.3	6.3	24	19.1	0.04	1.1	0.219	4.10	21	15	6254	67	13	5.37	<0.3	<0.3	1021	0.89	47
1222	474594	5164160	8.0	61.5	6.2	22	18.7	0.07	1.8	0.785	7.13	16	37	4107	74	20	3.23	INF	INF	5617	1.44	98
1223	473657	5164440	2.0	<10	9.4	1653	19.1	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
1224	473270	5165321	NM	60.4	9.5	1811	19.1	0.04	1.9	0.867	5.49	23	41	5121	1462	35	2.79	INF	INF	8798	2.6	99
1225	472764	5164757	2.0	69.8	7.9	3116	19.1	0.11	3.4	0.919	14.30	10	22	2242	2857	672	12.39	<0.3	<0.3	7600	1.86	41
1226	472158	5165430	6.0	52.5	7.4	1759	18.8	0.09	2.2	0.695	7.72	22	29	5344	94	24	5.38	<0.3	<0.3	3746	1.21	62
1227	471755	5165443	10.0	49.5	7.4	254	18.7	0.40	19.0	2.036	18.33	21	131	11954	220	190	78.26	INF	INF	10561	0.84	125
1228	471191	5164709	9.0	46.2	7.6	1418	18.8	0.17	6.6	0.962	14.48	23	50	7567	2698	232	22.82	INF	INF	6051	1.09	91
1229	473029	5163911	4.0	68.0	7.4	781	18.1	0.08	1.6	1.006	3.11	9	29	3634	57	11	2.93	1.9	1.9	3948	0.77	63
1230	472722	5163362	7.0	55.7	6.5	58	18.5	0.06	1.6	0.843	4.12	11	26	2178	51	20	4.61	<0.3	<0.3	4419	1.9	86
1231	472758	5162182	17.0	56.4	5.0	23	19.4	0.19	5.8	0.647	2.86	13	31	6962	57	21	11.31	0.8	2.4	4742	0.95	63
1232	471430	5161610	3.0	54.8	4.7	24	18.3	0.05	1.5	0.447	3.58	10	24	2290	49	21	2.34	INF	INF	3089	0.65	43
1233	473004	5160530	2.0	41.7	5.1	22	18.0	0.08	1.7	0.690	4.74	20	26	5113	59	22	4.64	<0.3	<0.3	3972	0.99	74
1234	470221	5158483	2.0	61.1	5.6	28	18.0	0.10	2.1	1.195	2.55	9	25	2633	45	23	7.82	0.9	1.8	7379	0.96	95
1235	469228	5158832	3.0	68.3	5.7	24	18.1	0.06	0.8	1.342	1.75	7	29	2851	49	14	3.13	<0.3	<0.3	4468	0.68	170
1236	468764	5159675	1.0	30.6	4.7	23	18.1	0.27	2.9	0.431	3.47	25	21	4756	68	28	9.76	0.5	1.4	1966	2.98	31
1237	468430	5159342	1.0	54.1	4.8	25	18.7	0.06	1.6	0.723	1.74	9	18	2053	61	11	4.87	0.3	1.5	3796	0.98	17
1238	468671	5157432	1.0	NS	5.3	29	18.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1239	467927	5154283	3.0	<10	5.9	48	18.2	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
1240	467314	5152766	2.0	26.7	6.2	65	18.9	0.05	2.8	0.434	6.30	31	26	14177	156	29	3.96	INF	INF	2383	1.54	66
1241	466825	5152857	1.0	18.7	6.3	60	19.4	0.06	2.6	0.418	7.29	33	19	11636	204	25	4.05	0.8	0.7	1851	1.1	57
1242	467151	5151945	7.0	NS	6.3	71	19.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1243	467032	5150224	8.0	<10	6.5	102	19.0	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
1244	466749	5149335	2.0	NS	6.7	101	19.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1245	470229	5150602	2.0	33.8	6.1	69	18.5	0.46	5.7	1.695	9.12	70	53	18340	151	77	24.36	INF	INF	2788	2.4	94
1246	471013	5150252	1.0	18.4	5.5	26	17.9	0.28	3.7	0.729	6.86	59	26	15395	155	44	11.31	0.8	1.9	1158	2.32	65
1247	469542	5152289	3.0	NS	5.8	82	18.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1248	472033	5152219	4.0	NS	6.4	112	19.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1249	472822	5151317	1.0	NS	6.3	57	19.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1250	472970	5150569	1.0	NS	5.8	26	19.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1251	477917	5150099	1.0	NS	5.8	34	18.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1252	481178	5150565	1.0	10.6	6.2	120	18.4	0.25	17.0	1.393	60.46	82	165	32696	384	633	23.18	3.7	2.4	3996	1.87	131

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method----------------->		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit------->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units----------------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
1253	481894	5150123	4.0	39.2	6.4	127	19.0	0.58	4.0	1.073	8.39	42	40	14626	115	52	10.85	1.3	2.6	3300	1.57	96
1254	482805	5150153	1.0	17.8	5.5	26	19.6	0.57	2.6	0.231	3.02	36	18	7023	85	28	9.66	0.6	1.7	917	2.09	22
1255	482903	5151280	4.0	26.0	6.0	90	19.3	0.27	3.0	1.112	16.83	62	50	19649	281	117	9.51	INF	INF	2668	1.96	102
1256	483985	5150282	1.0	15.1	6.2	119	19.3	0.47	2.6	0.223	4.41	39	21	8522	114	40	9.04	<0.3	<0.3	963	1.16	29
1257	485246	5149780	1.0	20.8	5.8	166	18.6	0.70	13.0	0.800	6.00	57	118	13136	396	143	22.37	4.1	21.5	1337	1.97	53
1258	486018	5151057	1.0	40.7	5.5	66	19.1	1.36	11.0	0.789	7.09	48	75	10558	76	130	20.64	5.6	3.5	2726	4.58	43
1259	486597	5150935	2.0	26.8	5.6	26	19.4	0.89	15.0	1.603	14.07	104	240	26851	170	315	37.99	9.9	39.8	2826	3.16	131
1260	486917	5152323	3.0	<10	6.1	99	19.0	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
1261	490448	5153450	2.0	<10	6.8	196	18.7	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
1262	493032	5151142	2.0	78.9	6.4	90	18.7	0.67	8.8	0.821	5.03	23	91	5515	108	133	9.38	3.2	2.4	4625	4.11	13
1263	493147	5152293	1.0	NS	6.1	40	18.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1264	493781	5152536	1.0	NS	5.8	29	18.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1265	494862	5155134	2.0	62.6	4.6	43	19.5	0.61	4.7	0.701	4.81	14	43	5828	69	51	5.72	1.8	1.0	4379	0.94	48
1266	496850	5156994	11.0	77.5	4.1	32	18.9	0.59	9.4	1.094	2.67	8	56	11874	55	31	4.31	1.4	1.1	6181	0.78	126
1267	495084	5157795	1.0	46.0	4.6	26	18.8	0.58	14.0	1.318	8.27	43	112	8096	90	231	17.32	2.9	2.1	2886	1.91	45
1268	496263	5158334	9.0	54.2	5.2	27	19.4	0.90	4.9	0.554	5.54	31	52	17604	114	33	8.50	1.0	<0.3	4584	0.73	79
1269	495830	5158612	1.0	NS	5.5	31	19.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1270	497769	5158766	7.0	47.8	5.6	45	19.6	0.65	4.9	0.727	7.16	37	51	14415	123	59	9.48	2.0	2.9	3147	1.01	81
1271	497226	5159686	2.0	29.9	6.9	111	20.1	0.84	7.0	1.689	6.43	33	67	7954	95	79	12.72	1.9	3.0	2998	5.94	47
1272	496162	5159290	4.0	68.6	6.7	113	20.2	0.66	4.2	1.333	2.74	15	62	6250	100	35	5.62	2.6	2.7	5105	0.66	120
1273	495451	5159461	1.0	<10	5.7	52	18.4	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
1274	498056	5157461	5.0	42.8	5.7	41	19.4	0.47	3.9	0.844	6.39	32	49	9145	80	55	7.32	1.7	2.4	3464	1.69	80
1275	497759	5157492	1.0	<10	5.1	28	20.0	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
1276	498995	5156855	1.0	NS	4.6	22	20.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1277	498383	5156621	1.0	34.1	4.1	26	20.3	0.45	6.4	0.732	9.84	42	91	8032	87	175	10.52	2.2	2.9	1516	14.3	27
1278	498897	5155877	1.0	18.9	4.9	27	20.5	0.21	4.9	0.443	5.81	28	74	8017	72	86	8.42	2.9	3.0	1222	8.09	25
1279	498551	5154530	1.0	38.2	5.0	24	20.4	0.24	3.6	0.483	7.08	27	80	4901	70	126	9.42	2.1	1.2	1890	4.1	16
1280	497474	5155559	1.0	NS	4.3	26	20.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1281	496544	5154562	1.0	61.0	4.2	26	20.4	0.44	7.9	0.832	7.38	23	88	4968	63	168	9.52	2.3	2.1	3767	3.52	19
1282	495950	5154447	1.0	85.2	4.9	27	20.2	0.50	7.8	0.912	6.33	13	122	5081	64	186	10.86	5.3	3.9	4063	1.87	15
1283	496239	5153023	1.0	23.2	5.4	33	20.5	0.20	10.0	0.895	9.40	65	119	13552	110	137	13.06	2.9	3.0	1745	28.2	42
1284	493668	5150568	7.0	43.5	5.9	293	20.2	0.35	11.0	0.873	16.73	42	173	10736	158	291	9.73	4.0	3.3	4139	1.91	73
1285	491229	5150261	1.0	NS	3.2	695	20.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1286	490387	5150081	8.0	47.1	3.5	228	21.0	0.51	8.0	0.726	7.28	33	69	11056	106	118	8.31	1.8	2.5	3506	0.89	60
1287	490372	5151209	1.0	NS	5.2	37	21.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1288	489997	5151520	1.0	NS	4.8	NM	21.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1289	488731	5151071	14.0	61.0	5.0	26	20.5	0.38	6.1	0.707	9.87	21	43	23053	85	31	6.25	1.2	2.7	7698	1.51	69
1290	489233	5150718	13.0	61.9	4.7	29	20.0	0.60	3.6	0.860	4.18	19	64	11884	135	31	5.42	2.1	2.2	6766	0.9	115
1291	484047	5148805	8.0	72.6	5.7	397	19.5	0.49	2.1	0.906	1.63	7	25	3956	564	13	2.71	2.0	2.1	4364	0.72	40
1292	483774	5148998	11.0	70.8	5.8	346	20.0	0.53	2.5	0.852	2.06	7	24	4663	291	16	3.08	1.9	2.1	4257	0.79	43
1293	482169	5148527	7.0	58.7	5.7	141	20.3	0.54	6.0	0.695	3.58	16	47	8029	84	44	9.24	1.8	4.7	4584	0.99	61
1294	479316	5149267	4.0	18.0	6.1	115	20.6	0.28	3.2	0.862	18.72	88	33	30646	243	75	10.84	0.5	1.4	1358	1.36	130
1295	477320	5148170	2.0	41.2	6.7	129	21.3	0.21	2.7	0.982	6.54	35	36	9510	108	44	8.90	0.9	0.8	3207	2.1	85
1296	473951	5149384	6.0	NS	6.5	39	21.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1297	472826	5148506	6.0	15.3	6.4	41	20.9	0.25	6.6	0.780	14.35	72	35	28903	178	55	9.77	1.1	2.1	1278	1.84	133
1298	471439	5148623	9.0	29.2	6.4	41	20.9	0.23	3.4	1.001	8.82	50	32	19737	117	39	8.95	1.0	2.0	1828	1.92	92
1299	466296	5147279	18.0	NS	6.7	59	19.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1301	470062	5146883	6.0	NS	6.5	3	20.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1302	470798	5147046	4.0	43.0	6.2	34	21.7	0.24	2.7	0.915	3.93	32	26	10226	91	23	8.17	1.4	2.0	2612	1.44	76
1303	471075	5146318	7.0	52.7	5.6	30	20.9	0.34	2.1	0.850	3.15	17	47	12483	102	19	5.44	<0.3	<0.3	6550	0.99	100
1304	471528	5145491	6.0	43.8	5.2	26	18.8	0.21	3.0	0.778	4.28	31	30	10780	87	25	7.23	0.8	2.2	3064	1.79	88
1305	471917	5144284	12.0	36.8	6.2	53	20.7	0.29	5.2	1.043	10.06	38	36	18230	109	31	10.35	1.2	2.3	3983	1.55	107
1306	473375	5142749	1.0	36.0	6.1	58	22.1	0.23	2.4	0.762	3.24	32	29	6709	98	20	6.54	0.5	1.4	1768	4.75	18
1307	472723	5145464	4.0	39.6	6.2	47	21.8	0.16	2.2	0.544	4.42	29	24	9142	67	28	7.00	1.1	2.0	2169	1.23	62
1308	472933	5146398	6.0	43.0	6.1	30	21.9	0.39	3.4	0.862	7.01	41	34	14522	94	31	13.36	1.5	2.4	2938	1.71	87
1309	472490	5146711	5.0	55.7	6.0	26	21.2	0.07	1.6	0.666	1.90	10	18	4836	53	15	4.02	0.9	2.0	3180	1.28	59
1310	473755	5147597	1.0	80.6	5.5	22	23.8	0.55	3.9	0.928	2.09	16	37	3808	48	26	12.44	2.9	2.9	3691	4.62	16
1311	473407	5147855	1.0	44.5	5.4	31	23.5	0.39	2.8	0.583	1.97	24	27	3487	59	19	9.08	1.6	2.6	2054	9.66	15
1312	473295	5147548	1.0	61.9	5.1	28	21.5	0.42	1.1	0.800	1.20	17	37	2490	46	9	9.33	3.3	2.7	2605	9.44	8
1313	474527	5148339	1.0	91.7	NM	NM	NM	0.11	1.8	0.458	1.29	<4	21	2532	46	25	6.46	0.9	0.7	3717	1.57	15
1314	475406	5146015	1.0	87.2	5.7	26	22.7	0.17	2.5	0.687	1.26	5	33	4546	40	21	4.42	1.9	2.7	4850	7.88	8
1315	477346	5145568	1.0	23.9	5.9	54	21.3	0.42	5.3	0.625	12.13	65	58	19923	118	83	17.14	2.3	12.3	1499	4.34	96
1316	479165	5146802	1.0	59.6	5.6	29	22.7	0.93	6.8	1.169	4.38	25	82	5542	69	105	19.93	3.4	4.6	4889	4.56	42
1317	479659	5146227	1.0	NS	6.2	40	22.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1318	480475	5145906	1.0	25.5	6.0	31	23.4	0.88	6.0	0.489	5.06	50	46	12778	107	50	13.68	0.8	1.8	1169	3.38	28
1319	483092	5145921	1.0	45.2	6.3	305	22.4	0.33	1.8	0.638	2.11	16	24	3056	409	23	4.94	0.6	1.2	2511	2.04	14
1320	483760	5146690	6.0	81.2	5.3	69	21.7	0.30	4.0	1.253	2.54	7	33	6994	43	17	3.39	0.7	<0.3	5140	0.7	150
1321	484661	5147233	1.0	NS	5.3	212	22.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1322	485527	5148202	1.0	<10	5.3	41	22.7	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
1323	497861	5144754	3.0	14.9	8.0	438	20.6	0.08	3.7	0.480	12.55	54	49	18132	441	93	7.94	1.2	2.1	2094	1.51	74
1324	498712	5143617	5.0	34.7	7.6	274	20.9	0.19	4.4	0.732	13.00	55	92	15022	281	115	10.28	3.1	4.2	2847	1.28	96
1325	498165	5142917	6.0	32.7	7.6	282	20.8	0.17	6.6	1.657	32.97	59	59	21909	299	81	6.49	2.7	3.2	2347	3.83	191
1326	499202	5142540	2.0	NS	7.1	482	20.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1327	498762	5141599	9.0	45.7	5.5	413	20.9	0.19	6.5	1.276	12.10	33	90	9577	506	100	8.98	6.2	4.5	4621	1.57	107
1328	497441	5140598	9.0	50.3	5.8	74	21.0	0.26	4.3	0.702	13.63	31	62	14718	107	63	9.85	2.8	3.9	3867	1.38	74
1329	497125	5141932	8.0	53.3	6.3	244	20.8	0.31	13.0	0.885	12.53	50	156	14990	704	229	21.64	6.7	5.5	6163	1.24	98
1330	497063	5143333	7.0	27.1	6.8	426	21.2	0.15	3.2	0.698	14.54	70	68	21119	411	90	18.32	2.6	3.6	2229	1.62	115
1331	495871	5144259	14.0	14.6	7.0	1635	21.2	6.34	40.0	9.100	400.00	80	5417	52792	841	12017	149.48	106.2	50.8	23007	4.2	983
1332	494490	5143223	4.0	NS	7.1	1603	20.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1333	493492	5142299	1.0	NS	7.2	1585	20.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1334	494519	5141019	12.0	48.3	6.4	114	21.0	0.32	8.3	0.802	13.64	41	121	20804	122	130	12.58	4.8	4.0	7500	1.66	75
1335	494184	5140808	1.0	62.6	5.0	49	21.6	0.74	25.0	2.544	21.67	23	331	9211	83	710	26.99	16.1	13.5	7510	7.65	69
1336	493345	5140775	1.0	NS	6.0	77	21.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1337	492952	5137381	5.0	47.7	6.0	46	17.0	0.33	2.8	0.627	5.60	41	59	14778	139	45	6.76	3.9	1.0	3529	0.98	102

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method---------------->		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOE	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOE
	Detection Limit-------->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units-------------------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
1338	492036	5137070	5.0	26.8	5.7	63	18.2	0.17	3.3	0.617	17.28	65	43	20802	178	71	9.80	1.7	2.2	1936	1.52	109
1339	491646	5135876	10.0	30.8	6.1	38	21.5	0.17	2.8	0.732	13.70	62	71	17989	165	83	10.48	3.0	3.1	2473	2.66	96
1340	489986	5136295	13.0	20.4	6.5	68	21.4	0.20	3.9	0.967	20.58	71	58	31950	213	74	9.54	2.1	2.2	1329	2.63	129
1341	487231	5144894	2.0	49.8	6.9	126	20.7	0.42	20.0	2.319	246.80	23	336	23029	299	15733	18.93	2.9	2.8	27837	4.2	262
1342	487304	5143131	2.0	46.0	7.0	102	21.0	0.25	10.0	0.544	3.55	14	38	4326	94	47	6.39	INF	INF	3689	2.29	40
1343	487008	5143654	3.0	NS	6.4	36	21.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1344	485531	5144695	5.0	65.6	6.2	636	21.3	0.15	8.9	0.885	2.91	7	41	5474	56	26	5.22	4.2	3.0	4607	7.12	80
1345	485056	5143351	1.0	NS	5.6	75	21.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1346	484108	5143776	2.0	28.3	6.0	236	21.3	0.26	2.5	1.019	19.89	9	166	4378	1041	669	9.48	0.7	1.4	7507	0.92	67
1347	482395	5143681	1.0	NS	6.3	159	21.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1348	484751	5142961	6.0	57.8	6.0	34	21.2	0.21	7.0	0.742	5.90	12	65	7584	81	71	12.47	INF	INF	5393	10.4	79
1349	484647	5142233	7.0	69.5	5.3	19	18.0	0.16	3.0	0.849	2.90	7	41	5603	51	26	5.84	2.4	2.3	4532	7.18	80
1350	484500	5142050	1.0	90.1	4.3	25	21.9	0.21	7.1	1.139	8.25	<4	99	3841	41	209	17.25	3.4	2.6	5289	10.9	44
1351	481822	5142057	1.0	NS	4.8	23	21.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1352	478804	5141729	3.0	NS	5.9	95	21.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1353	478370	5142130	11.0	NS	6.4	136	21.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1354	475691	5141624	10.0	41.7	6.7	629	21.4	0.41	4.2	0.782	13.76	42	65	18378	787	96	14.07	INF	INF	5728	5.14	93
1355	476511	5143097	8.0	51.6	6.9	353	21.3	0.51	17.0	1.881	13.99	30	161	17436	324	231	44.80	7.8	4.4	11846	1.63	117
1356	477696	5143512	2.0	11.3	6.8	126	21.3	0.14	6.6	0.517	11.16	47	31	18494	200	37	16.20	<0.3	0.8	1674	1.26	99
1357	503580	5155119	1.0	NS	6.8	68	21.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1358	502982	5156897	5.0	61.4	6.5	37	22.2	0.22	4.6	0.920	5.04	19	72	6595	77	75	6.09	1.4	0.9	4561	1	73
1359	507633	5157774	2.0	NS	6.1	39	21.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1360	517948	5165717	1.0	40.6	7.1	207	20.3	0.04	35.0	0.319	4.49	114	83	5364	169	96	7.89	8.1	2.5	7295	6.07	36
1361	517884	5166266	11.0	40.8	7.3	344	20.2	0.09	32.0	0.496	7.78	73	103	8305	232	91	13.95	9.3	3.7	9214	7.82	49
1362	517091	5166017	1.0	NS	7.5	325	20.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1363	515118	5160541	5.0	69.5	6.7	53	23.7	0.53	141.0	1.875	34.29	14	804	10117	152	833	72.26	INF	INF	7731	0.29	133
1364	503298	5148823	3.0	26.3	7.4	792	23.7	0.18	9.0	0.707	15.30	55	85	19585	1100	152	16.22	3.2	2.3	3696	1.03	110
1365	502950	5146502	4.0	59.6	9.7	401	24.2	0.53	8.7	0.847	9.63	31	144	12287	663	189	13.76	INF	INF	7764	1.39	72
1366	502130	5144914	3.0	74.7	9.7	250	24.3	0.24	9.5	1.065	14.79	34	154	6915	124	153	11.98	INF	INF	5237	1.49	119
1368	501808	5141295	1.0	NS	7.7	NM	24.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1369	500917	5141588	2.0	50.5	5.4	407	23.8	0.11	5.5	0.609	5.35	13	45	5279	1090	86	5.05	1.3	1.7	3673	1.57	40
1370	500820	5140845	1.0	NS	5.3	277	23.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1371	501057	5139687	6.0	45.2	6.5	355	23.5	0.28	10.0	1.701	14.69	39	192	11475	547	294	17.64	<0.3	0.8	6643	2.34	110
1372	500379	5137671	9.0	43.2	6.5	44	22.2	0.24	INF	1.250	16.59	45	104	16453	91	125	10.61	INF	INF	5781	2.15	130
1373	500116	5136474	14.0	40.8	6.4	32	21.8	0.26	8.8	1.046	31.99	53	119	34622	162	131	15.38	4.8	4.5	4201	13.1	123
1374	498825	5135234	1.0	NS	5.9	25	22.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1375	498710	5134317	45.0	NS	5.5	26	22.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1376	497812	5134767	11.0	68.9	4.4	32	21.5	0.13	4.9	0.678	3.48	12	45	7714	66	62	4.88	1.4	1.1	5547	2.83	56
1377	497339	5134822	11.0	59.8	NM	NM	NM	0.16	5.1	0.777	8.19	23	83	9388	82	82	11.80	4.4	4.9	4848	7.82	78
1378	497101	5135086	8.0	57.5	4.1	36	22.3	0.16	7.6	0.971	4.64	14	67	6970	63	81	9.02	2.1	1.9	4758	6.24	78
1379	496063	5135181	12.0	26.5	5.2	51	22.0	0.18	8.2	1.536	25.02	55	80	30114	115	102	10.70	5.1	4.3	2190	10.1	172
1380	496272	5133531	21.0	NS	NM	NM	NM	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1381	497069	5133730	8.0	41.0	5.0	37	22.1	0.06	2.5	0.522	5.64	21	42	6581	73	66	5.91	1.7	2.2	3048	5.96	55
1382	497514	5133131	10.0	NS	4.6	32	22.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1383	498300	5132939	20.0	56.3	4.3	26	21.3	0.72	43.0	1.545	15.12	12	252	13344	56	446	31.66	14.2	13.4	10748	2.45	81
1384	498759	5133102	1.0	NS	4.2	21	21.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1385	499034	5133513	3.0	55.7	4.4	18	17.6	0.06	1.3	0.665	2.73	12	26	3830	57	31	3.11	0.6	0.6	3266	7.87	56
1386	499154	5132965	5.0	36.0	4.1	19	19.3	0.08	2.6	0.584	5.08	26	22	8561	89	31	4.99	0.8	0.6	2223	15.4	57
1387	496830	5132259	8.0	79.3	4.1	18	23.5	0.06	1.8	0.874	1.98	6	41	4974	57	20	2.62	<0.3	<0.3	4389	2.43	103
1388	496725	5132682	8.0	44.5	NM	NM	NM	0.08	3.6	0.815	5.09	24	35	8040	79	47	6.73	1.7	1.3	2935	5.48	76
1389	496716	5133057	13.0	NS	4.5	32	22.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1390	496268	5132491	1.0	91.2	4.4	26	24.5	0.15	10.0	0.852	8.21	4	109	3961	59	250	14.20	5.0	3.8	6296	2.2	27
1391	496118	5131661	8.0	81.7	4.2	17	23.8	0.13	6.5	1.070	2.11	7	52	11244	36	46	5.37	4.1	3.5	5697	1.67	116
1392	496848	5131322	6.0	48.2	4.2	20	23.4	0.12	3.5	0.715	4.02	19	37	6615	206	50	5.63	1.8	3.7	3387	3.03	55
1393	496529	5130903	3.0	45.4	NM	NM	NM	0.14	6.1	0.688	5.90	20	72	5525	61	113	9.67	3.9	4.1	3730	4.7	50
1394	498470	5129886	2.0	50.9	NM	NM	NM	0.07	2.2	0.629	3.35	11	37	2234	378	61	4.46	1.3	0.8	3642	16.6	32
1395	498484	5130606	7.0	51.2	4.1	31	24.4	0.10	3.7	0.680	3.50	14	39	4277	57	49	6.11	1.5	1.2	3194	5.89	46
1396	499639	5129609	1.0	48.9	4.3	30	23.9	0.07	3.0	0.550	4.07	17	36	3970	59	44	5.61	1.6	1.8	3446	16.5	31
1397	497070	5128320	2.0	39.1	4.3	28	23.1	0.06	2.6	0.366	2.78	18	21	4381	68	28	5.23	1.1	0.6	2015	9.5	20
1398	497537	5128884	1.0	39.9	3.8	29	23.3	0.18	6.1	0.617	5.74	20	81	3428	39	158	14.58	5.5	5.4	2924	34.7	26
1399	498686	5128349	11.0	57.1	4.0	25	23.1	0.12	4.5	0.640	2.51	10	37	13084	44	30	9.30	0.6	<0.3	6211	9.6	63
1400	498922	5127516	1.0	41.8	4.1	27	24.5	0.04	1.4	0.282	1.92	13	17	2738	37	26	3.44	<0.3	<0.3	2507	20.1	11
1401	499070	5127009	4.0	57.7	4.2	31	24.9	0.06	2.9	0.787	3.65	17	36	4293	63	43	5.12	1.1	1.1	4039	14.3	59
1402	499747	5126591	27.0	NS	NM	NM	NM	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1403	496691	5127358	4.0	46.3	4.4	29	23.2	0.09	2.0	0.570	3.25	17	27	4770	60	33	5.24	0.9	<0.3	2817	16.4	40
1404	496166	5126176	8.0	66.2	4.2	23	23.0	0.09	1.6	0.794	2.30	7	31	3551	49	21	3.33	<0.3	<0.3	3758	13	58
1405	495842	5125320	5.0	77.0	4.0	23	23.1	<0.02	1.1	0.875	1.88	8	17	3678	49	11	2.26	<0.3	<0.3	3764	7.79	56
1406	493842	5122621	7.0	44.3	4.2	25	22.9	0.11	1.5	0.403	3.14	21	20	8812	80	17	5.69	<0.3	<0.3	2948	8.34	38
1407	493192	5121931	8.0	70.4	4.0	29	23.2	0.05	2.3	0.893	4.30	12	27	4512	58	15	3.41	<0.3	<0.3	4548	4.72	68
1408	497023	5124619	8.0	53.4	4.1	31	22.7	0.12	4.0	0.687	5.02	16	31	9319	71	36	8.06	0.9	0.6	5133	4.01	60
1409	498587	5124887	11.0	18.0	5.2	29	23.3	0.09	4.9	0.546	19.02	64	38	24947	209	57	7.72	1.3	1.1	1427	7.11	133
1410	498954	5123984	5.0	49.6	5.4	35	24.1	0.14	4.2	0.688	8.18	46	46	16748	148	50	8.22	2.5	0.7	5641	1.9	100
1411	498066	5123104	10.0	27.8	5.7	31	23.3	0.09	2.1	0.482	11.19	49	31	16210	146	45	8.05	1.2	0.8	2153	3.74	89
1412	498627	5122323	17.0	NS	5.4	29	23.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1413	501059	5122957	1.0	80.6	4.2	30	24.9	0.06	2.2	0.812	3.02	14	43	4681	55	24	5.95	2.5	2.7	3492	1.72	8
1414	501065	5125446	1.0	53.8	4.2	32	25.4	0.10	5.3	0.625	4.55	12	65	3778	60	97	14.99	2.8	2.3	4367	0.67	26
1415	502034	5127266	1.0	12.3	4.1	29	25.3	0.08	4.3	0.390	10.45	52	28	14451	91	84	10.65	1.0	0.8	738	1.16	58
1416	501415	5131363	4.0	35.5	4.5	NM	24.1	0.07	3.4	0.623	11.64	38	46	14459	94	54	6.00	1.7	2.5	3560	11.3	87
1417	500949	5132113	10.0	42.9	4.4	25	23.0	0.14	10.0	0.555	4.96	17	42	9339	77	51	12.39	1.3	0.9	5547	4.5	52
1418	501566	5132019	4.0	33.2	4.6	23	23.1	0.07	3.3	0.561	11.65	36	42	14386	99	56	5.76	4.3	3.8	3336	9.83	77
1419	500417	5134345	3.0	43.8	4.8	26	23.7	0.07	2.3	0.599	5.69	19	44	5068	68	56	5.23	1.6	1.2	3155	14.5	48
1420	501218	5135926	6.0	24.4	4.9	28	24.1	0.04	3.2	0.383	11.35	39	33	14600	145	44	5.63	1.3	2.0	1725	9.6	79
1421	502534	5138563	3.0	31.1	5.4	33	24.4	0.09	3.2	0.427	10.80	55	42	17644	167	48	6.60	1.7	1.9	2954	3.56	75
1423	515113	5160068	4.0	78.3	5.7	100	24.5	0.30	83.5	2.269	24.86	16	522	6063	72	525	48.70	INF	INF	8918	0.4	157

Site	Easting	Northing	Lake	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
Number	Method-------------->		Depth	Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit------>			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units-------------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
1424	505917	5146727	9.0	NS	7.8	383	21.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1425	504084	5145793	9.0	NS	7.7	385	22.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1429	502705	5140252	16.0	28.5	8.0	449	22.6	0.17	5.3	1.076	15.28	55	57	20085	447	83	9.49	1.7	1.3	2323	1.78	134
1430	501241	5136887	16.0	38.4	7.0	39	22.8	0.18	5.8	0.791	15.98	46	64	19086	215	67	14.09	2.5	3.7	3357	9.84	87
1431	502563	5137489	3.0	63.2	6.9	31	23.4	0.10	4.3	0.938	5.77	<4	<5	39	<10	<5	5.53	2.0	3.5	51	10.9	<1
1432	503349	5138186	19.0	51.1	6.6	32	22.6	0.16	5.1	0.850	38.69	38	51	28772	121	43	9.96	1.9	4.5	5706	13.4	108
1433	504737	5139031	1.0	57.1	6.2	29	23.8	0.05	2.1	0.419	2.82	24	31	4208	64	31	3.91	1.1	2.6	4108	8.33	13
1434	504464	5139801	11.0	15.7	6.5	43	22.7	0.06	3.2	0.351	11.57	56	38	19205	209	52	6.70	1.4	2.1	1743	2.85	73
1435	506474	5142750	10.0	30.9	7.2	194	23.2	0.11	4.5	0.765	10.75	50	78	18068	766	136	8.24	2.4	3.2	3254	2.25	91
1436	509880	5141950	2.0	NS	7.2	104	23.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1437	509738	5144021	2.0	69.9	6.8	64	23.8	0.13	5.2	0.850	13.59	21	156	5933	263	340	6.29	5.5	3.7	6144	2.26	58
1438	508714	5144192	10.0	23.9	6.6	40	23.1	0.13	4.1	0.680	17.43	64	71	22188	169	141	8.91	2.5	2.8	2922	2.31	104
1439	510360	5145396	20.0	42.0	6.8	51	22.5	0.24	11.0	1.189	26.49	58	251	23223	116	356	10.37	8.2	7.0	4084	5.47	152
1440	511151	5145582	8.0	NS	7.3	190	22.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1441	511021	5144593	6.0	NS	7.5	221	23.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1442	511322	5144586	11.0	NS	8.0	137	22.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1443	513026	5140016	11.0	44.6	6.5	52	18.7	0.21	5.2	0.552	10.26	49	75	20013	185	75	8.50	1.4	1.1	5067	1.55	85
1444	507311	5137574	4.0	36.8	6.6	39	23.4	0.12	3.4	0.556	10.19	46	52	12838	114	64	6.65	1.4	1.1	2587	4.3	84
1445	507637	5136889	4.0	36.4	6.7	39	23.6	0.15	4.3	0.577	12.17	48	53	14532	116	62	7.13	1.5	1.1	2818	4.18	92
1446	504901	5133325	5.0	10.5	6.4	30	23.3	0.05	1.6	0.291	18.69	57	22	22346	186	44	5.82	0.7	1.0	663	3.44	94
1447	505302	5134170	4.0	29.4	6.3	29	23.6	0.09	3.5	0.467	12.29	52	41	18235	150	53	6.27	1.2	1.2	2000	7.82	106
1448	504528	5135763	29.0	NS	6.2	29	22.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1449	501870	5135581	1.0	NS	5.8	32	23.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1450	502292	5134861	8.0	30.6	6.1	32	22.5	0.13	3.3	0.404	13.50	54	35	21356	208	46	8.05	1.0	0.8	2070	3.41	79
1451	501105	5133969	1.0	24.6	5.6	30	24.2	0.05	1.7	0.398	3.80	31	17	5897	84	45	5.11	<0.3	<0.3	1204	37.2	18
1452	503814	5132416	11.0	NS	5.9	31	23.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1453	505743	5131659	7.0	21.1	6.1	32	23.5	0.09	2.7	0.425	13.90	61	32	23138	200	52	7.30	0.9	0.9	1317	2.92	101
1454	501757	5130086	7.0	38.3	6.1	35	24.0	0.14	2.3	0.541	10.96	48	41	18689	143	45	6.43	0.8	<0.3	2902	1.94	82
1455	500523	5127890	16.0	NS	6.0	29	23.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1456	500642	5126221	35.0	NS	NM	NM	NM	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1457	501862	5124621	1.0	NS	4.8	29	24.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1458	502218	5122045	4.0	41.4	5.4	31	23.8	0.15	3.1	0.590	8.08	55	38	19060	139	41	7.37	0.6	<0.3	2966	1.08	95
1459	503728	5124143	5.0	16.2	6.0	42	23.2	0.09	2.9	0.502	16.30	82	37	29973	250	67	7.14	0.8	1.9	1076	2.16	128
1460	504225	5125527	7.0	NS	6.2	42	23.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1461	503363	5126332	5.0	26.0	6.0	27	22.6	0.09	1.9	0.437	13.04	56	29	20018	195	48	6.77	<0.3	0.7	1709	1.02	92
1462	504461	5127406	16.0	NS	6.1	38	23.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1463	506294	5129371	3.0	37.8	6.2	39	23.8	0.26	5.2	0.608	10.77	73	65	23379	181	80	12.14	1.3	0.9	4264	1.8	107
1464	506351	5128219	5.0	32.5	6.0	37	21.9	0.20	2.6	0.554	12.24	60	39	20386	155	55	8.96	1.5	1.0	2113	1.4	98
1465	509232	5128495	3.0	46.1	5.7	28	23.2	0.13	3.3	0.595	6.55	46	44	13164	132	56	7.26	1.5	0.8	3486	1.34	75
1466	509296	5127366	16.0	NS	6.1	32	23.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1467	515729	5122162	8.0	37.5	6.5	169	23.2	0.18	5.9	0.988	11.89	49	52	18850	291	69	19.12	7.5	2.2	4013	1.21	107
1468	514971	5124922	3.0	NS	6.6	174	24.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1469	519578	5124137	6.0	NS	6.5	52	22.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1470	520511	5123270	7.0	31.5	6.6	54	23.1	0.20	2.2	0.524	9.72	62	40	22998	217	43	7.93	2.6	<0.3	2275	1.06	104
1471	522299	5122151	5.0	59.7	3.8	24	15.2	0.14	2.9	0.691	6.10	40	37	15424	112	30	6.30	<0.3	<0.3	3826	0.87	87
1472	523562	5122582	2.0	61.6	4.9	27	22.4	0.18	11.0	1.701	9.58	23	103	9459	76	148	36.20	4.0	2.5	8395	1.05	107
1473	522293	5124707	7.0	46.6	5.6	32	23.6	0.14	3.1	0.846	9.52	53	50	12270	99	41	7.18	1.1	1.0	3496	1.12	101
1474	520976	5125564	8.0	42.9	6.1	37	23.9	0.12	4.1	0.726	11.34	58	45	21046	126	44	7.29	1.1	1.2	3636	1.85	102
1475	521253	5126349	18.0	49.3	5.3	38	17.9	0.20	3.9	0.816	6.19	40	46	15516	195	35	9.38	0.7	0.6	3490	1.13	85
1476	522309	5125825	7.0	48.0	5.4	34	22.6	0.09	1.7	0.661	6.38	38	40	9265	90	32	5.12	0.7	1.0	3147	0.92	67
1477	524489	5125216	4.0	50.5	5.8	28	22.8	0.11	3.6	0.719	4.48	32	41	8189	101	44	9.36	1.0	0.9	3907	0.64	61
1478	526195	5124347	8.0	54.3	5.7	25	23.8	0.12	3.2	0.593	7.66	44	41	17620	112	36	7.39	0.7	0.6	5676	0.73	107
1479	529107	5123128	3.0	58.4	5.5	23	24.6	0.06	1.3	0.635	6.14	29	29	9082	109	23	3.23	<0.3	<0.3	4266	0.55	93
1480	529548	5123224	7.0	67.1	4.9	18	22.0	0.06	1.4	0.719	3.64	18	34	6279	74	17	2.96	<0.3	<0.3	3885	0.43	71
1481	529422	5124432	16.0	47.8	5.5	27	22.5	0.13	3.9	0.680	8.80	43	43	11702	86	38	11.65	1.0	0.9	3708	1	75
1482	529156	5125772	1.0	49.7	5.8	28	23.2	0.09	1.6	0.723	9.68	45	34	10366	85	31	5.06	<0.3	<0.3	3161	1.06	93
1483	529544	5125028	4.0	58.1	5.9	28	23.8	0.11	3.8	1.338	10.16	30	45	10902	59	52	18.18	1.3	0.9	6283	0.95	109
1484	530643	5123768	4.0	35.0	6.0	29	24.0	0.08	1.6	0.561	23.30	43	31	34049	138	31	3.13	0.6	1.5	31765	1.27	108
1485	531068	5124431	12.0	57.8	6.2	36	24.1	0.09	3.3	0.719	9.55	27	35	11169	103	27	13.60	0.7	<0.3	7834	1.28	77
1486	531380	5123499	10.0	37.8	6.3	35	24.1	0.08	2.1	0.733	10.12	55	39	21021	194	33	5.09	0.8	0.8	2782	2.3	127
1487	531211	5122749	11.0	53.2	6.3	31	24.4	0.20	12.0	1.314	17.56	33	84	17250	89	97	46.90	3.7	1.9	10999	1.12	130
1488	532501	5122427	17.0	55.8	6.0	21	23.7	0.11	3.2	0.595	26.26	32	36	21561	71	26	6.72	0.7	0.6	6111	1.12	86
1489	533362	5122502	5.0	NS	6.3	31	22.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1490	533055	5123863	9.0	52.7	6.3	27	23.0	0.13	2.4	0.755	10.43	31	45	9572	68	30	7.43	0.9	1.0	10563	1.92	79
1491	532550	5124653	4.0	62.1	5.8	23	23.0	0.12	2.9	0.727	4.38	35	47	11003	101	25	5.54	0.6	<0.3	3899	1.68	128
1492	534701	5125113	14.0	52.9	6.2	27	21.5	0.17	2.5	0.617	10.46	33	35	13102	76	23	7.35	0.7	<0.3	5517	1.24	82
1493	535788	5124822	6.0	67.5	4.8	19	16.3	0.09	1.5	0.623	3.66	12	43	5585	60	16	2.50	<0.3	<0.3	9483	1.06	77
1494	535225	5124418	14.0	54.4	5.4	27	21.3	0.14	3.7	0.940	10.46	32	37	9784	90	32	13.58	0.9	0.7	7766	1.13	100
1495	535095	5123270	13.0	50.8	5.7	28	21.9	0.14	2.5	0.673	7.90	32	30	11371	72	23	10.76	0.6	<0.3	5316	0.91	81
1496	535409	5122506	6.0	43.5	5.8	28	22.4	0.10	2.2	0.815	10.80	32	31	13514	164	30	7.70	1.6	0.9	13998	0.99	76
1497	536006	5123127	5.0	58.0	5.8	27	23.1	0.06	2.0	0.739	4.70	36	30	3828	42	25	3.87	0.6	<0.3	4369	0.98	81
1498	536830	5124339	1.0	NS	5.6	22	22.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1499	536650	5125291	6.0	42.1	5.6	30	22.9	0.15	2.4	0.804	15.26	57	39	18770	114	41	7.94	0.7	0.6	3086	1.51	128
1500	537024	5126693	7.0	48.6	6.0	31	23.2	0.10	2.7	0.627	6.26	36	45	9887	87	25	6.63	0.9	0.6	5328	1.57	72
1501	536753	5126982	12.0	68.1	4.9	19	20.5	0.10	1.9	0.597	4.24	21	45	6672	41	19	2.92	<0.3	<0.3	5008	1.05	74
1502	538380	5128774	3.0	36.3	5.6	37	23.4	0.11	2.8	0.836	13.07	66	37	20098	152	48	8.83	INF	INF	2709	2.26	121
1508	537198	5131095	5.0	53.8	6.3	43	24.4	0.14	INF	0.672	10.29	30	45	22468	158	30	6.91	INF	INF	23130	1.08	89
1509	536547	5130410	8.0	57.5	6.2	26	24.3	0.25	15.0	1.574	11.44	23	114	12607	70	141	61.80	4.5	3.8	11593	0.99	110
1510	536498	5131236	4.0	59.5	6.0	33	24.3	0.12	1.8	0.628	5.24	17	46	9095	114	23	3.85	<0.3	<0.3	10304	1.1	88
1511	532348	5139878	3.0	<10	6.3	50	24.4	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD	MRD
1512	533722	5146573	2.0	NS	6.7	48	23.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1513	536730	5149481	3.0	NS	7.0	72	25.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1514	535861	5154322	1.0	33.9	7.0	45	26.7	0.20	6.4	0.608	7.86	70	63	20110	143	65	19.43	1.5	0.8	1144	3.49	59
1516	534242	5160258	9.0	19.4	5.2	26	23.6	0.04	1.6	0.281	7.07	26	22	10435	159	23	3.92	1.2	1.1	1249	0.8	45

Site Number	Easting	Northing	Lake Depth	LOI	pH	Cond	Temp	Ag	As	Cd	Co	Cr	Cu	Fe	Na	Ni	Pb	Pd	Pt	S	U	Zn
	Method--------------->			Grav	YSI	YSI	YSI	ICPMS	INAA	ICPMS	ICPMS	ICPOES	ICPOES	ICPOES	ICPOES	ICPOES	ICPMS	FAICPMS	FAICPMS	ICP-OES	ICPMS	ICPOES
	Detection Limit------->			0.1	0.01	1	0.01	0.02	0.5	0.050	0.05	4	5	5	10	5	0.05	0.3	0.3	30	0.05	2
	Units--------------->		m	%		µS/cm	C	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppm
	(NAD 83 ZONE 17)																					
1517	532555	5159415	14.0	66.2	4.2	27	20.2	0.20	4.6	0.618	3.04	13	40	5466	83	18	7.50	0.7	<0.3	4524	1.53	40
1518	532452	5160887	9.0	63.7	4.1	26	23.5	0.10	INF	0.733	5.52	14	48	4412	53	40	6.52	INF	INF	4097	1.54	64
1519	532556	5161464	1.0	NS	4.6	26	24.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1520	517356	5141445	4.0	46.7	6.9	49	22.9	0.16	3.1	0.559	8.96	54	66	14165	143	96	8.30	1.8	1.2	3817	2.7	75
1521	515892	5139634	3.0	29.3	6.6	51	23.1	0.14	2.6	0.453	11.06	65	53	19238	150	86	9.30	1.4	1.1	2130	2.06	84
1522	517965	5137998	13.0	21.5	6.5	32	22.9	0.15	2.2	0.476	19.16	76	31	26335	172	59	8.37	0.7	0.7	1092	1.81	132
1523	519294	5136935	5.0	35.5	6.4	53	22.3	0.16	4.1	0.678	14.09	64	85	19947	166	99	11.60	2.4	1.8	3744	3.69	92
1524	516588	5135405	1.0	13.0	6.0	39	23.7	0.09	3.2	0.441	10.67	59	36	19478	99	88	10.16	<0.3	0.8	593	3.32	53
1525	516007	5132188	7.0	23.2	6.5	54	22.6	0.16	2.7	0.393	17.55	75	33	25407	179	58	9.05	INF	INF	1275	1.56	117
1526	519687	5129000	4.0	24.2	6.8	93	22.8	0.08	11.0	0.288	11.39	67	31	19997	193	37	5.42	2.2	1.0	2712	5.74	67
1527	520750	5130075	1.0	56.6	7.0	52	24.0	0.09	3.0	0.438	6.17	41	35	10631	119	43	7.86	0.8	0.8	4042	1.88	36
1528	524004	5131308	6.0	16.4	6.9	47	23.4	0.16	3.9	0.427	21.06	92	49	37383	235	66	11.11	0.9	1.5	1283	4.21	132
1529	523426	5128934	6.0	29.9	6.7	47	22.8	0.14	3.3	0.651	22.55	81	38	30535	180	67	8.67	0.9	0.9	1833	1.85	154
1530	523122	5128614	4.0	43.5	6.1	45	22.5	0.15	1.4	0.854	6.03	34	38	9454	108	32	7.51	0.8	0.8	3976	1.25	74
1531	522514	5128713	4.0	39.3	6.1	45	23.7	0.12	1.5	0.609	8.14	44	31	12764	108	35	6.37	0.7	0.7	2453	1.41	80
1532	522259	5127337	15.0	52.8	5.9	38	21.5	0.25	8.7	0.838	7.34	33	55	13644	83	47	24.90	1.5	3.5	5482	1.24	77
1533	524765	5128912	6.0	31.7	6.3	46	22.5	0.14	1.8	0.633	14.40	71	38	22084	153	59	8.26	0.8	0.8	2016	1.8	116
1534	527684	5126546	2.0	NS	5.3	21	22.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1535	527932	5127665	16.0	NS	5.7	30	22.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1536	529341	5127787	19.0	NS	6.1	32	22.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1537	531008	5127139	23.0	NS	6.0	29	23.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1538	531330	5126147	5.0	42.1	6.0	27	22.5	0.09	1.9	0.897	10.40	43	40	11556	179	31	6.22	0.7	<0.3	4049	4.33	98
1539	531435	5125574	19.0	41.7	6.1	27	22.5	0.11	2.9	0.762	11.19	37	35	12812	118	26	7.83	<0.3	0.6	3027	2.74	88
1540	533503	5125490	4.0	55.9	5.9	26	23.1	0.07	2.5	0.622	9.68	36	31	12120	82	29	4.48	0.6	<0.3	4059	1.13	81
1541	535128	5127627	4.0	30.7	6.4	37	23.8	0.11	2.5	0.724	19.26	72	34	24666	152	53	7.82	0.8	0.8	2267	1.95	144
1542	535497	5127695	7.0	47.8	5.6	25	22.8	0.10	2.2	0.574	8.03	47	39	15526	134	32	6.73	<0.3	<0.3	3653	0.88	93
1543	536704	5128198	8.0	28.4	6.4	40	24.0	0.14	2.5	0.469	16.10	78	32	26902	172	49	11.54	<0.3	0.6	1881	1.57	113
1544	536145	5128827	5.0	20.8	6.4	40	23.7	0.12	2.1	0.439	18.03	80	30	29805	154	53	13.57	0.9	0.8	1823	1.2	113
1545	534637	5129291	3.0	64.6	5.3	25	22.1	0.06	2.4	0.748	3.45	15	33	4035	49	26	7.80	0.8	0.8	5581	1.3	65
1546	534118	5129037	3.0	60.9	5.4	26	23.0	0.07	2.0	0.763	4.45	25	31	5190	60	26	5.01	0.7	<0.3	4300	1.76	72
1547	530265	5131070	1.0	63.0	5.2	27	23.6	0.17	1.8	0.497	3.90	36	60	6258	63	24	7.48	1.0	0.8	2622	5.39	15
1548	528524	5135781	8.0	17.4	6.1	48	23.8	0.11	3.3	0.458	18.59	74	27	27479	187	56	7.82	0.6	0.8	966	1.41	121
1549	523414	5140319	5.0	40.5	5.7	47	22.3	0.19	2.3	0.565	8.29	56	43	17200	143	42	7.75	0.7	0.8	2353	1.68	83
1550	522531	5140175	5.0	NS	6.4	55	24.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1551	521000	5138600	7.0	NS	6.4	55	23.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1552	522384	5142307	3.0	NS	6.6	58	24.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1553	523508	5143639	3.0	24.4	6.4	45	23.9	0.14	3.4	0.605	16.56	65	36	21169	182	53	6.54	1.2	1.1	1649	3.47	117
1554	525814	5145246	7.0	22.3	6.1	38	23.1	0.15	3.0	0.298	11.67	63	35	20344	152	46	9.42	0.9	0.8	1275	1.79	74
1555	526102	5145606	12.0	NS	6.0	40	22.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1556	526192	5146054	9.0	39.2	5.6	37	20.7	0.21	2.4	0.525	8.95	58	53	17188	149	57	11.00	INF	INF	2913	2.07	75
1557	526576	5146386	8.0	39.0	5.8	39	22.1	0.18	2.0	0.482	8.74	61	44	17205	137	46	8.41	1.2	0.9	2638	2.41	81
1558	527370	5146945	6.0	32.3	5.6	41	20.6	0.16	2.5	0.433	9.81	57	38	17198	139	45	7.89	1.1	0.8	2331	2.08	75
1559	528821	5147630	9.0	41.8	5.8	37	22.1	0.24	2.7	0.424	9.35	60	45	18787	114	44	10.53	0.9	0.8	2751	1.6	73
1560	529695	5147836	7.0	33.8	5.6	38	21.9	0.20	2.0	0.469	9.33	60	44	18211	125	51	9.73	1.1	0.7	2744	1.42	77
1561	530956	5147749	4.0	35.0	5.5	35	21.6	0.16	2.6	0.452	9.06	62	38	17486	125	48	8.48	0.7	0.8	2447	1.34	78
1562	531679	5147898	8.0	68.7	4.4	16	21.4	0.08	1.8	0.533	3.37	17	44	5730	86	19	2.48	<0.3	<0.3	6848	0.79	94
1563	532229	5147942	6.0	49.4	4.9	29	22.0	0.11	2.6	0.389	6.43	49	58	14845	151	37	5.53	0.7	<0.3	5226	0.98	92
1564	530632	5158300	7.0	71.3	4.1	24	24.1	0.10	2.8	0.578	3.70	14	45	5839	62	23	3.18	1.1	<0.3	4536	1.45	61
1565	529209	5160230	4.0	76.2	6.3	83	23.8	0.02	11.0	0.354	2.29	7	21	3582	90	25	4.42	INF	INF	11011	1.35	38
2488	537969	5204148	1.0	11.9	6.1	57	25.1	0.03	0.7	0.216	1.14	10	8	2044	41	10	6.81	<0.3	0.3	1189	0.39	19
4255	503940	5146780	8.0	10.6	NM	NM	NM	0.17	22.0	0.722	22.22	56	215	25554	291	310	22.41	8.8	8.8	3202	1.42	111
mean			6.5	46.5	5.4	64	20.3	0.14	4.9	0.729	9.31	27.2	52.7	11661	92	68.0	8.94	1.5	1.5	4352	3.95	71.0
median			4.0	47.6	5.4	28	20.0	0.10	3.0	0.651	6.61	23.0	37.0	8540	61	26.0	6.58	0.9	1.1	3809	2.09	67.0
StDev			6.6	16.3	0.9	196	2.1	0.2	10.9	0.4	15.1	16.5	159.4	11038.8	143.1	557.0	10.3	3.7	2.6	2615.9	7.7	47.9
count			1461	1308	1453	1443	1453	1290	1248	1290	1290	1290	1290	1290	1290	1290	1290	1096	1096	1290	1290	1290
min			0.1	<10	3.1	11	10.3	<0.02	<0.5	0.074	0.61	<4	<5	39	<10	<5	1.20	<0.3	<0.3	51	0.18	<2
max			48.0	93.3	9.7	3116	26.7	6.34	229.0	9.1	400.0	162	5417	148188	2857	15733	149.5	106.2	50.8	31765	89.09	983

Cond = Electrical Conductivity measured from the YSI unit

ORP = Oxidation-reduction potential measured from the YSI unit

D.O. = Dissolved oxygen in percent saturation (%) and concentration (mg/L) measured from the YSI unit

Temp = Temperature in degrees Celsius measured from the YSI unit

Notes: NS = No Sample; INF = Insufficient sample for analysis, NM = Not Measured, sample lost at lab, MRD = data is available in MRD-131

Metric Conversion Table

Conversion from SI to Imperial			**Conversion from Imperial to SI**		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
			LENGTH		
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
			AREA		
1 cm^2	0.155 0	square inches	1 square inch	**6.451 6**	cm^2
1 m^2	10.763 9	square feet	1 square foot	**0.092 903 04**	m^2
1 km^2	0.386 10	square miles	1 square mile	2.589 988	km^2
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
			VOLUME		
1 cm^3	0.061 023	cubic inches	1 cubic inch	**16.387 064**	cm^3
1 m^3	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m^3
1 m^3	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m^3
			CAPACITY		
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
			MASS		
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	**907.184 74**	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 90**	t
			CONCENTRATION		
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.

ISSN 0826-9580
ISBN 0-7794-5863-X

MAPS

NOT FILMED

CARTES

NON FILMÉ

Micromedia
ProQuest

20 Victoria Street
Toronto, Ontario M5C 2N8
Tel.: (416) 362-5211
Toll Free: 1-800-387-2689
Fax: (416) 362-6161
Email: info@micromedia.on.ca